

79 00067

bart impact program

INDIRECT ENVIRONMENTAL IMPACTS OF BART



technical memorandum

The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is being conducted by the Metropolitan Transportation Commission, a nine-county regional agency established by state law in 1970.

The program is financed by the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, and the California Department of Transportation. Management of the Federally funded portion of the program is vested in the U.S. Department of Transportation.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. The benefits of BART, and their distribution, will be weighed against the negative impacts and costs of the system in an objective evaluation of the contribution that the rapid transit investment makes toward meeting the needs and objectives of this metropolitan area and all of its people.

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BART IMPACT PROGRAM

INDIRECT ENVIRONMENTAL IMPACTS

TECHNICAL MEMORANDUM



PREPARED BY
GRUEN ASSOCIATES, INC.

UNDER CONTRACT WITH THE
METROPOLITAN TRANSPORTATION COMMISSION

FOR THE
U. S. DEPARTMENT OF TRANSPORTATION

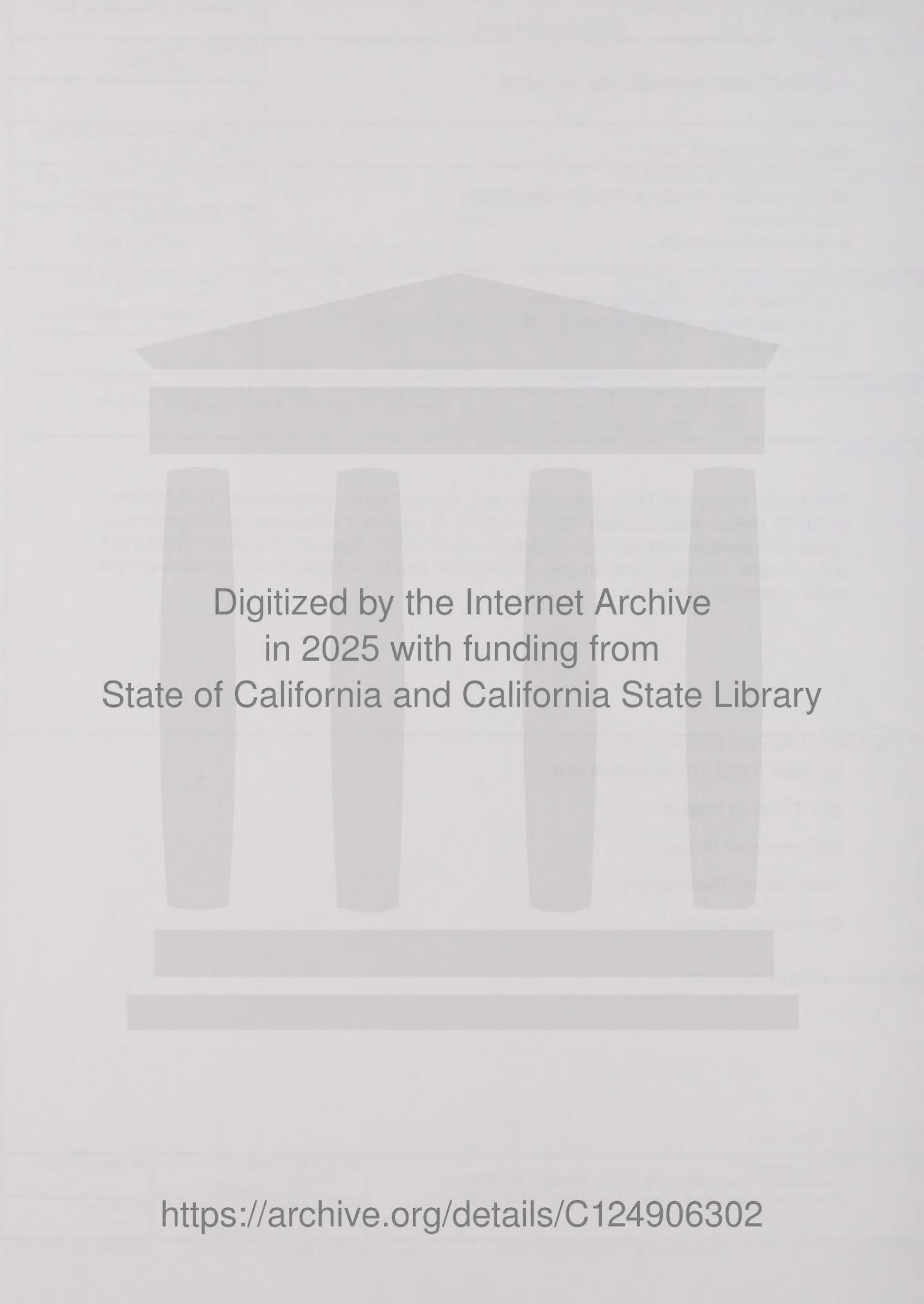
AND THE
U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

UNDER
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SAN FRANCISCO BAY REGION
CENTRAL AREA

BART: THE BAY AREA RAPID TRANSIT SYSTEM

Length: The 71-mile system includes 20 miles of subway, 24 miles on elevated structures and 27 miles at ground level. The subway sections are in San Francisco, Berkeley, downtown Oakland, the Berkeley Hills Tunnel and the Transbay Tube.

Stations: The 34 stations include 13 elevated, 14 subway and 7 at ground level. They are spaced at an average distance of 2.1 miles: stations in the downtowns are less than 1/2-mile apart while those in suburban areas are 2 to 4 miles apart. Parking lots at 23 stations have a total of 19,000 spaces. There is a fee (25¢) at only one of the parking lots. BART and local agencies provide bus service to all stations.

Trains: Trains are from 4 to 10 cars long. Each car is 70 feet long and has 72 seats. Top speed is 80 mph with an average speed of 38 mph including station stops. All trains stop at all stations on the route.

Automation: Trains are automatically controlled by the central computer at BART headquarters. A train operator on-board each train can over-ride automatic controls in an emergency.

Magnetically encoded tickets with values up to \$20 are issued by vending machines. Automated fare gates at each station compute the appropriate fare and deduct it from the ticket value. At least one agent is present at each station to assist patrons.

Fares: Fares range from 25¢ to \$1.45, depending upon trip length. Discount fares are available for the physically handicapped, children 12 and under and persons 65 and over.

Service: BART serves the counties of Alameda, Contra Costa and San Francisco, which have a combined population of 2.4 million. The system was opened in five stages, from September, 1972, to September, 1974. The last section to open was the Transbay Tube linking Oakland and the East Bay with San Francisco and the West Bay.

Routes are identified by the terminal stations: Daly City in the West Bay, Richmond, Concord and Fremont in the East Bay. Trains operate every 12 minutes during the daytime on three routes: Concord - Daly City, Fremont - Daly City, Richmond - Fremont. This results in 6-minute train frequencies in San Francisco, downtown Oakland and the Fremont line where routes converge. In the evening, trains are dispatched every 20 minutes on only the Richmond - Fremont and Concord - Daly City routes. Service is provided weekdays only, between 6 A.M. and midnight. Future service will include a Richmond - Daly City route and weekend service. Trains will operate every 6 minutes on all routes during the peak periods of travel.

Patronage: Approximately 130,000 one-way trips are made each day. 200,000 trips are anticipated under full service conditions.

Cost: BART construction and equipment cost \$1.6 billion, financed primarily from local funds: \$942 million from bonds being repaid by the property and sales taxes in the three counties, \$176 million from toll revenues of transbay bridges, \$315 million from federal grants, and \$186 million from interest earnings and other sources.

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SUMMARY AND CONCLUSIONS

This report documents the significant physical development and land-use policy changes which have occurred to date in areas adjacent to the BART stations (approximately one-fourth to one-half mile from each station) and discusses the environmental impacts associated with those changes. The SUMMARY AND CONCLUSIONS section considers separately the issues of (1) development and policy changes near BART stations, (2) the resulting impacts and (3) the publicly-funded street improvements made in conjunction with BART construction.

DEVELOPMENT AND LAND-USE POLICY CHANGES

Only 12 of the station areas within the 34-station BART system have experienced significant physical development changes to date; in each case, the development occurred along with changes in local land-use policy or zoning regulations. The greatest development has occurred in downtown San Francisco and Oakland, the destinations of nearly one-half of the system's patrons. Further findings on station-area development and policy change and its relationship to BART are as follows:

- Downtown San Francisco has experienced the most dramatic change. From 1960 to 1975, major office space increased by approximately 20 million gross square feet through the construction of 39 new buildings, ranging from 10 to 52 stories in height. The new buildings are generally taller (averaging 26 stories) and bulkier (averaging 500,000 gross square feet) than those constructed before 1960, and they are concentrated in an area of approximately one square mile near the Embarcadero and Montgomery BART stations. Corresponding to the increase in office space, the estimated number of workers increased from 115,000 in 1960 to 192,000 in 1975.
- Other stations which have experienced development include: Downtown Oakland (12th and 19th Streets), Berkeley, Richmond, Walnut Creek, Lake Merritt (Oakland), Union City and Fremont. Development near these stations has included shopping, cultural, educational and recreational facilities as well as office buildings. BART stations are within or adjacent to major redevelopment projects in Richmond, Oakland (12th Street), and San Francisco (Market Street).
- One of the most apparent direct links between BART and the physical development change occurs in downtown San Francisco through building bonus provisions in the City's zoning ordinance. Under the provisions, a developer can receive a 20 percent

increase in a project's floor area ratio (FAR) by having a direct entranceway to a BART station. However, few buildings have taken advantage of this bonus. A 10 percent bonus is offered for simply locating a new building within 750 feet of a BART station.

- Another direct link between BART and station-area development takes the form of non-cash credits toward obtaining federal grants for redevelopment projects near BART stations. Such credits have been used in Oakland and Richmond and are available for the Yerba Buena project in downtown San Francisco.
- Around many stations (over one-half), changes in public policy, primarily related to zoning and land use, have occurred. These changes have resulted both in upzoning (higher residential densities or changes from residential to commercial uses) and downzoning (higher to lower residential densities). Many sites in which policy change has occurred have not yet experienced significant physical changes.

The patterns of land use change around BART stations clearly indicate that the presence of a rapid transit station does not automatically lead to immediate development changes in the surrounding area. Development around any new facility is dependent on timing and the presence of many supporting factors. In general, development takes place where market demand is high and when the following supportive conditions exist:

- Appropriate zoning and other regulatory measures along with compatible land uses.
- Available vacant land or large parcels easy to assemble.
- Land costs compatible with overall costs of development.
- Public approval of the proposed development or of the general direction in which the area is going.

The nature of the BART system itself may be the reason for the development status. BART is basically a "commuter rail" transportation system, bringing riders from low-density residential suburbs to high-density downtown work places. About one-half of BART's total patronage occurs during a four-hour peak period, and nearly 50 percent of its patrons board and exit from the seven downtown stations in San Francisco, Oakland, and Berkeley. These downtown areas have been the sites for most of the change occurring near BART because, from the developer's perspective, location of new activities or intensification of existing ones is most logical in areas where large numbers of people are concentrated for an extended period of time.

The likelihood of development occurring is directly related to the number of these supportive conditions which are present in an area. Where none of these conditions exists, development will generally not take place at all or will occur slowly, over a long period of time.

The role of public intervention in development is complicated. It can reinforce development or no-development preferences, but it alone cannot guarantee their attainment. In encouraging development, it is most effective when it occurs simultaneously with other favorable conditions. Alone, it is more likely to be effective in preventing development when that is the preference.

Development potential, then, is the result of the interaction of certain regulatory, economic, market, and political factors in the right place at the right time. A single happening, such as BART, is not sufficient in itself to result in the automatic generation of development. It seems that the development at BART station sites might have occurred without BART's presence; BART's real development impact will be felt at those sites where it has caused local regulation changes, but only when the other necessary conditions emerge.

Comparison with Other Transit Systems

The apparent lack of new development around most BART stations outside downtown San Francisco is not surprising in the light of experience elsewhere. Studies of land development impacts¹ of recent transit improvements indicate that such impacts depend heavily on the presence of other factors in addition to transit-system access. In Toronto, for example, such factors include extensive zoning incentives, a major regional surge in demand for apartments and offices, and a tradition of in-town, transit-oriented living. Together, these induced substantial high-rise development at some stations. On Philadelphia's Lindenwold Line, residential property values have been increased, but community preferences for a low-density environment have effectively limited development. Aside from some minor office development at one or two stations, and one very large shopping and apartment complex, very few actual land use changes have occurred. In the case of the one large development, Echelon Mall, the key factor was the availability of a single large tract of land, not near another regional shopping center; this was unique in the region.

Other new transit systems or extensions in Montreal, Chicago, Cleveland, and Boston have had similar effects, all highly dependent on the existence or absence of powerful development-inducing forces in addition to the transit system. In many suburban areas, for example, stations have been located in other rail or freeway rights-of-way to ease land costs and direct

¹Knight, R. L. and L. L. Trygg, Land Use Impacts of Rapid Transit: Implications of Recent Experience, DOT-OS-60181 (Washington, D.C.: U.S. Department of Transportation, 1977).

environmental impacts, with the result that the station sites have not been attractive for development. In other cases, strong counterforces in local policy, overall access of the site, difficult land assembly, and lack of regional demand have been effective curbs on development.

As in San Francisco, major new downtown development has occurred in Toronto and Montreal. In both cases, most observers agree that the influence of the new transit system on such CBD growth was important, but not solely responsible, since other factors such as the availability of development capital, regional demand, an already attractive and healthy downtown, and public policy encouragements were also present and powerful. These same factors have been visible in downtown San Francisco's recent surge of development.

ENVIRONMENTAL IMPACTS

Environmental impacts of various types have resulted from the development changes near BART stations. These impacts include current and potential future impacts, and they range from minimal to significant in their intensity.

In the case of downtown San Francisco, the major impacts have been those associated with the massive concentration of high-rise buildings in a relatively small area. These impacts are related to the visual and microclimate (wind and shadow) effects of the new developments. Impacts related primarily to automobile use (e.g., air quality and noise) have been relatively insignificant due to: (1) lack of substantial increase in automobile use in the downtown area, (2) relatively high level of pre-BART impacts, (3) new regulations designed to reduce automobile-generated impacts, and (4) extensive reliance on the public transportation system.

Based on a review of data related to Bay Area growth and development, it appears that most of the development occurring over the past 15 years in downtown San Francisco would have occurred there even without the presence of BART, and the remainder represents a redistribution of development which would have occurred in other locations throughout the Bay Area.¹ Some of the impacts associated with the new development thus represent impacts which might have been somewhat more diffused throughout the region. However, the nature of the impacts associated with concentrated versus more dispersed development can be quite different.

¹ See Chapter 3: REGIONAL SETTING and Appendix A: OVERVIEW OF BAY AREA GROWTH AND DEVELOPMENT

Dispersed development, as evaluated on a prototypical basis in The Costs of Sprawl,¹ generally leads to: (1) higher economic costs--capital and operation, and (2) environmental impacts--particularly air pollution, water pollution, energy, and natural. On the other hand, the visual and microclimate effects associated with concentrated, high-rise development may be greater than those of dispersed development.

The other fully developed downtown areas (Oakland, Richmond, and Berkeley) are similar to downtown San Francisco in terms of the development/impact process: that is, some of it represents a possible redistribution of development and impact which would have occurred within the Bay Area in any event. However, there are two significant differences: (1) the absolute levels of development and impact are much lower than in downtown San Francisco, and (2) these new developments are served by automobile to a greater extent (percentage wise) than is downtown San Francisco.

The remaining case study sites (Walnut Creek, Union City and Fremont) represent areas which were less developed than the other study areas prior to BART. In each case, the local adopted plan contemplates making the area around the BART station the "focal point" or "downtown" of these areas. If these plans are successfully implemented, these core areas will represent relatively dense developments compared to the present surrounding low-density uses. These new centers of activity will likely be served primarily by automobile. As a result, the types of impacts anticipated are noise and traffic-congestion-related, in addition to visual effects.

DEVELOPMENT QUALITY

The most effective street improvements built in conjunction with BART appear to be those which have a natural or consciously established focus. Probably the most successful designs discussed here are those of Market Street (San Francisco) and Nevin Mall (Richmond) -- one expensive and elaborate and the other relatively inexpensive and simple. Market Street is the line joining several areas of activity: the Civic Center, the central business district, the Embarcadero Center, and the waterfront. If completed as planned, improvements will begin at the foot of Twin Peaks (an area to be served by Muni Metro, not by BART) and increase in scale as they near downtown. Nevin Mall, on the other hand,

¹ Real Estate Research Corporation, The Costs of Sprawl: Executive Summary (Washington, D. C.: Council on Environmental Quality, Department of Housing and Urban Development, Environmental Protection Agency, 1974).

consciously determines the focus of BART station traffic by leading to the impressive new Social Security building. The street improvements at the Mission Street stations (San Francisco) and on Shattuck Avenue (Berkeley) seem to bring emphasis to the BART stations without effectively reinforcing nearby centers of community activity. Study of the publicly funded street improvements in the four areas mentioned has led to these further conclusions:

- The designing of street improvements so that they are functional calls for input from the best professional designers available. In the early stages of planning, a realistic projection of an area's activities and space needs is essential; the success or failure of the design will be defined primarily by its ability to meet those needs. Market Street provides well for the regular activity of the street and for the city's ceremonial activity. Nevin Mall is well designed for its simpler functions. The Shattuck plaza is less effective because the design does not realistically provide for the activity there. The Mission Street improvements are not suitable to the narrow sidewalk, and the design of the plazas is not fully responsive to their role as community ceremonial space.
- Design for permanence contributes to the continued success of public spaces. In furniture, simplicity of design and the least number of elements in each piece lend to durability. The use of simple design with heavy, permanent materials, as on Market Street, is effective. The more modest redwood benches at Nevin Mall will be more of a maintenance problem, but their design (low, ample, stable) helps to ensure their durability. Street furniture that is built into concrete or brick ground surfaces, as along Shattuck Avenue, is also durable.
- Sidewalk cleaning and the accumulation of litter seem to be the most consistent problems with street improvements near BART stations. (Nevin Mall is an exception, but traffic is still at a low level there). In some areas, most notably along Shattuck Avenue and along Market Street between 5th and 7th Streets, the problem is much worse than others. Litter receptacles which are adequate in size and number do not entirely solve the problem, but inadequate receptacles compound it. There seems to be a tradeoff between permanence of litter receptacles and their adequacy; concrete receptacles of reasonable size do not have a large capacity.

The bronze-clad concrete receptacles along Market Street are more serviceable than the concrete receptacles in Berkeley because their tops and liners remain intact, but neither type holds the litter generated in high-traffic areas.

- Basic planning for maintenance should take place prior to the construction of public areas and necessary staff and money budgeted at that time. It has been typical among the cases studied that upon completion of street improvements, confusion arises as to who is responsible for maintaining the new public spaces.
- Careful and consistent followup by the community or its representative seems to be essential to the maintenance of street improvements. The Market Street improvements, for example, require careful attention and ongoing negotiations with city, police and BART representatives as well as with the Market Street business community.

The public street improvements discussed here are varied in scope, cost and degree of success. Each street will change in character, and the real benefits and problems of each improvement project will be seen more easily over time.

CHAPTER 1. INTRODUCTION

This report presents an assessment of the environmental impacts of land development and policy changes which have taken place near BART facilities. These are termed BART's indirect environmental impacts. While separate from the direct environmental impacts of BART's facilities and operations, in most cases the indirect impacts result from changes in Bay Area land use and activity patterns caused in part by the presence of the BART system.

The basic objective of this study was to identify and discuss the land development and land-use policy changes affecting BART station areas. The focus was on the near-system, or microscale, land development changes, those changes which have occurred within one-quarter to one-half mile from the BART system. The study did not address possible development changes which have occurred, or may occur, at the subregional (city and county) and regional (Bay Area) scales. These issues will be considered by the Land Use and Urban Development study now underway as part of the BART Impact Program.

It is important to note that the changes identified here are not necessarily a direct result of BART's presence, although inferences relative to BART attribution are indicated where possible. All changes whether or not there is a clear understanding of BART's influence have been identified. This was done to insure that no major BART-induced development was omitted to help others to judge the extent of BART's influence based on the findings of the Land Use and Urban Development project.

A further point to keep in mind is that BART is a new phenomenon in the Bay Area, and the full consequences of the system have not yet been experienced. This is especially true of development changes which are a result of lengthy and complex public and private decisions. In some areas (e.g., downtown San Francisco) forces far beyond BART's sphere of influence have been at work to exert change. In other areas, the development impetus has not yet materialized. Only time will tell if the right combination of factors occurs to bring about change. Consequently, what is reported here must be viewed as interim findings, with the final impacts to remain unknown for many years.

REPORT FORMAT

Preceding this chapter, a Summary and Conclusions section briefly discusses the salient findings of the indirect impact study and outlines the study's conclusions (reasons for the identified changes, consequences of current impacts resulting from the development changes, and the potential

for future impacts). In addition it presents a comparative evaluation of the street improvement projects studied.

The main body of the report contains the following major sections:

- Methodology. Provides a summary of the approach followed to evaluate all BART station areas and the screening process utilized to obtain the final group of station areas which are treated as case studies.
- Development Setting and Change. Provides an overview of recent regional growth and development, discusses the development status of BART station areas throughout the system and characterizes the station areas which have experienced policy and/or development change.
- Station-Area Changes and Case Studies. Documents the development and/or policy changes which have occurred near all BART station areas and discusses the environmental impacts of those changes in the 12 station sites studied.
- Development Quality. Discusses four publicly funded street improvement projects accomplished in conjunction with BART construction and designed to enhance BART station-area development in San Francisco, Berkeley and Richmond.

CHAPTER 2. METHODOLOGY

This chapter presents the approach followed to: (1) identify and classify the physical and policy changes which have occurred near BART stations, and (2) assess the environmental impacts associated with the identified development or policy change.

IDENTIFICATION OF SETTING AND CHANGES

As part of the development identification process, the development setting around each station was determined from aerial photographs. This resulted in a systemwide generalized classification of the intensity of uses surrounding the 34 BART stations. It was an important step, since it helped determine the nature of impact assessment required. For example, the environmental impact assessment for development around the Union City station or Fremont station could differ considerably from that around the Richmond station or Berkeley station. The former stations are in open, developing areas, while the latter are in developed or redeveloping areas. In open, developing locations, natural impacts may be quite important, whereas noise may be of less concern. The opposite would be true in the locations of more intense development.

Based on an analysis of aerial photographs of each BART station area, the following three development intensity classifications were identified:

- Class 1 Station area essentially fully developed (approximately 90 to 95 percent developed).
- Class 2 Station area partially developed (approximately 25 to 90 percent developed).
- Class 3 Station area largely undeveloped (approximately 25 percent, or less, developed).

Comparison of the aerial photographs, coupled with discussions with local planning officials, also resulted in the identification of land uses near BART stations. The land use category typology was kept very broad -- residential, commercial, mixed (residential and commercial or industrial), and vacant -- and assignment of uses to categories was very generalized. As with the determination of development intensity, station-area land use classification was useful in determining the kind of impact assessment required.

Utilizing the 1965 and 1975 aerial photographs taken of each station area, changes in development were identified. In addition, community representatives (usually local planning officials) were interviewed and asked what

development changes occurred during this 10-year time period. Finally, the information from the photographs and community contacts was verified using additional input based on our own familiarity with the individual station areas from this study's Phase I work and additional recent field observations.

SELECTION OF CASE STUDY SITES

Utilizing the results from the identification of development and policy change, the 34 BART station areas were screened. This screening process was based on professional judgment and considered the following factors: development scale and timing (in relationship to BART); potential for environmental impact; and likely attribution of the change to the presence of BART.

As a result of the screening, 12 BART station areas were selected for in-depth evaluation (including environmental impact assessment). The Berkeley, Lake Merritt, downtown Oakland and San Francisco, and Richmond station areas are representative of essentially fully developed areas which have experienced intensive private sector or public sector (urban renewal) development before, during or after the development of BART. The Walnut Creek station area is representative of cases where either significant development and/or policy change has occurred in areas which are not yet fully developed. Finally, the Fremont and Union City station areas are representative of cases which were largely undeveloped prior to BART and have experienced significant growth in the post-BART period.

ENVIRONMENTAL IMPACT ASSESSMENT

The primary effort of this subtask was to assess environmental impacts associated with the identified development (or potential in the case of policy changes) that has occurred around BART stations. Generally, the same impact categories as in the assessment of BART's direct impacts were utilized: acoustic, atmospheric, natural, social and visual. However, some variations occurred among study sites because of particular site characteristics. For instance, shadows are an important factor in downtown San Francisco, but of little significance in suburban Fremont with its low profile development.

The approach was one which relied on secondary data sources and interviews with locally knowledgeable persons. Where available, recent Environmental Impact Reports (EIRs) were used as sources of information. In addition, other documents pertaining to impact categories (e.g., noise), rather than a specific location, were used for estimating effects. These various documents are noted in the text.

DEVELOPMENT QUALITY

Four locations of publicly funded improvements in areas adjacent to BART stations were studied. These cases were chosen for discussion because they clearly represent development beyond that which existed prior to BART construction;¹ in each case a conscious effort was made to change the street surface in restoring it after BART construction. While they vary in cost and scope, the improvements considered are all in urban areas: along Market Street and Mission Street in San Francisco, along Shattuck Avenue in Berkeley, and along Nevin Avenue in Richmond.

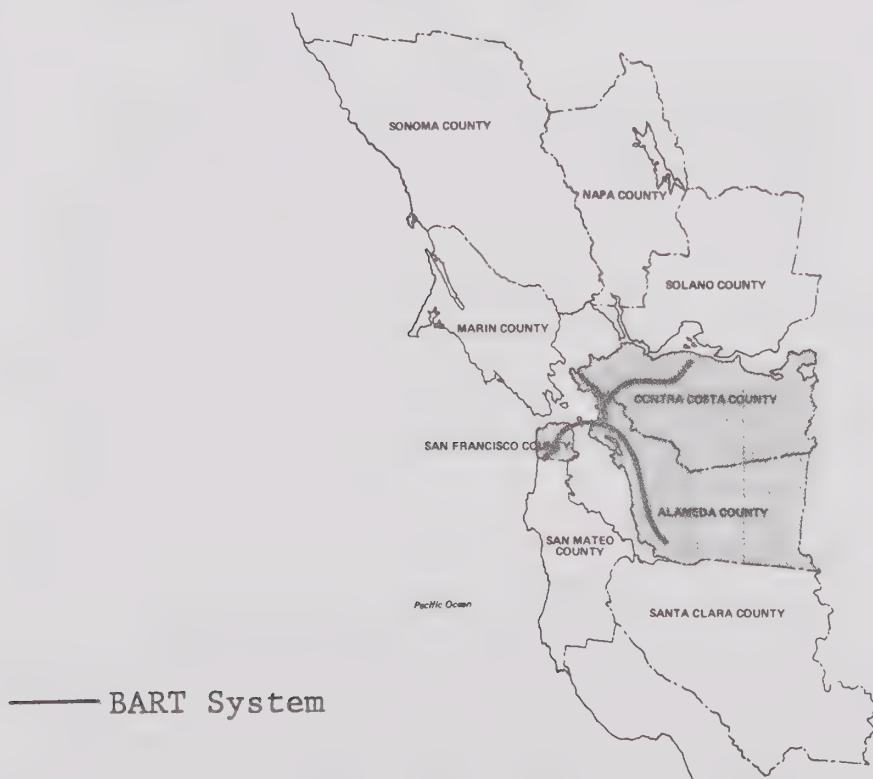
Information for the discussion was gathered primarily through site visits and interviews with city officials and community or project representatives who had close contact with the work while it was being accomplished. Additional information for the Market Street study was obtained from notebooks of news clippings and other project-related information compiled by the Market Street Development Project and available from the City Librarian at the San Francisco Public Library.

¹ Another type of publicly funded improvement is the linear parks beneath sections of aerial trackway. For a discussion of the BART-adjacent linear parks in Albany and El Cerrito, see Gruen Associates, Inc., Impacts of BART on Visual Quality: Interim Service Findings, Document No. DOT-BIP-TM 18-4-76 (Berkeley: Metropolitan Transportation Commission, March 1976).

CHAPTER 3. DEVELOPMENT SETTING AND CHANGE

This chapter establishes the background for considering development changes which have occurred near 12 of BART's stations. In the first section, a brief discussion of the Bay Area (population, employment, urbanization and transportation patterns) is presented to convey the general demographic/economic characteristics of the nine-county San Francisco Bay Area and of the three counties crossed by BART lines: Alameda, Contra Costa and San Francisco (Figure 1). The second section focuses on the development characteristics of the 34 BART station areas and presents an overview of the changes in land-use policy and development that have occurred since BART came into being.

Figure 1
NINE-COUNTY SAN FRANCISCO
BAY AREA



REGIONAL SETTING¹

Figures for population, employment, and land development show that recent Bay Area² growth has shifted away from the region's central area (San Francisco-Oakland-Berkeley) and into the developing southern core area around San Jose (Santa Clara County and southern Alameda County), with some growth as well in outlying suburban areas throughout the region.

Population

The 1975 Bay Area population is estimated to be 4,846,600,³ an increase of 10 percent over the 1970 population. Between 1960 and 1970, the Bay Area population increased from 3,639,000 to 4,628,200. About 48 percent of the present Bay Area population lives in the three BART counties. Before 1960, population was concentrated in San Francisco and Oakland. Since 1960, most growth has occurred in the southern Bay Area, while San Francisco and Oakland have decreased in population. Population in cities along the Richmond BART line has also generally decreased. Along the Concord line and southern portions of the Fremont line, population in the cities has increased.

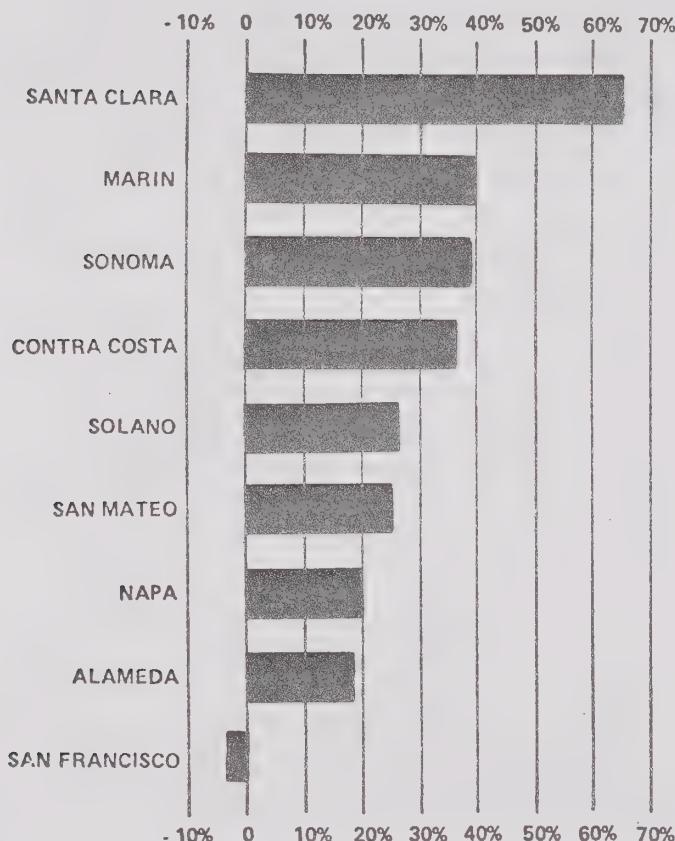
Counties in which BART is located have shown a mixed growth pattern which reinforces the pre-BART character of the areas. San Francisco County continues to experience a decline in population but remains a densely developed urban center. Western Contra Costa County (Richmond, El Cerrito and Albany) is densely urbanized and declining in population, while central Contra Costa is a rapidly growing, low-density suburban area. Alameda County has a declining population in the Oakland/Berkeley area, with vigorous growth and land development in the southern communities. Figure 2 displays 1960-1970 growth for each of the nine Bay Area counties, expressed as percent change in county population.

¹ See Appendix A for additional information on the Bay Area.

² The Bay Area includes nine counties: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma.

³ 1975 population estimate from California Department of Finance and Security Pacific Bank Research Department.

Figure 2
 PERCENT CHANGE IN POPULATION
 San Francisco Bay Area, By County, 1960-1970



Source: Security Pacific Bank Research Department

Employment

The total Bay Area civilian labor force in 1975 is estimated to be over 2.2 million, with 2 million employed.¹ San Francisco, Santa Clara, Alameda, and San Mateo Counties account for about 80 percent of the region's employment. While the actual number of jobs in the three BART counties grew from 932,300 to 1,147,600 between 1960 and 1970, the percentage went from 64 percent of the region's employment in 1960 to 58 percent in 1970 (due more to the southern growth than to a lack of employment growth in the BART counties).

¹ Security Pacific Bank Research Department.

Urbanization Patterns

Within the nine-county Bay Area there are 1,250 square miles of useable land.¹ By 1970 51 percent of this land was developed for urban uses. Urbanization of San Francisco County was virtually complete by 1970, while Alameda had over two-thirds of its useable land developed, and Contra Costa County had developed nearly half. Figures for population and housing density (Table 1) reflect San Francisco County's complete urbanization, while those for Contra Costa County underscore its large suburban area. Alameda County is an urban/suburban mixture typical of the region as a whole.

Table 1
POPULATION AND HOUSING DENSITY, 1970

Area	Persons/ Useable Acre	Housing Units/ Useable Acre
Alameda County	8.25	2.80
Contra Costa County	2.99	.93
San Francisco County	33.23	13.70
Bay Area (9-County)	5.83	1.95

Source: Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC), Projections of the Region's Future (Berkeley, California, September 1974).

As reflected by recorded subdivisions, land development in the Bay Area has slowed over the past 15 years, a trend which was evident in each of the three BART counties. The number of new dwelling units for each of the BART counties has remained a consistent fraction of the nine-county total, averaging 19 percent for Alameda County, 15 percent for Contra Costa County, and 6 percent for San Francisco County.

¹ Useable area excludes inland bodies of water, land designated as permanent open space, and most of the controlled-development open space in the ABAG Regional Plan, 1970-1990.

Transportation

The Bay Area's extensive highway network served an estimated 14 to 16 million trips per day in 1975.¹ At least 75 percent of these trips were made by automobile along the Bay Area's 17,600 miles of roadway, and less than 15 percent of the trips were made by bus transit. The remaining 10 percent were made by trucks and motorcycles. The major public transit operators,² together with smaller public services in San Mateo, Santa Rosa, Union City, and Napa, accounted for approximately 700,000 transit trips per day in 1975.

STATION-AREA SETTING AND CHANGE

The development status and land-use patterns around station areas can be summarized as follows:

- A large majority (27) of the 34 BART station sites are in fully developed areas, with the remaining 7 in partially developed areas.
- A majority (19) of the stations are in areas with a mixed land-use pattern, generally combining residential and commercial-retail activities. A substantial minority (9) are in downtown commercial-retail areas, and the remaining sites are either predominantly residential (4) or vacant (2).

Since the decision to construct BART, changes in local land use and zoning policies have occurred at 26 of BART's stations (Table 2). The number of sites with policy change which encourages increased density or a new type of development (e.g., a change from residential to commercial uses or a lifting of building height restrictions) is double those with new policies which discourage such change. Each of the policy-change options -- more restrictive, less restrictive, or none at all -- is well represented among fully developed station areas. Partially-developed areas most often adopted policy changes permitting more intense development.

¹ Caltrans, District 4.

² Major public transit operators include: Municipal Railway of San Francisco (Muni), Alameda-Contra Costa Transit District (AC), Golden Gate Bridge, Highway and Transportation District (Golden Gate), Bay Area Rapid Transit District (BART), and Santa Clara Transit District.

Table 2
STATION-AREA POLICY CHANGE/DEVELOPMENT SETTING

	Less Restrictive	More Restrictive	No Policy Change	Total Stations
Fully developed	13	8	6	27
Partially developed	5	-	2	7
Total Stations	18	8	8	34

As shown in Table 3, instances of less restrictive policy change have affected BART station areas within each land use category. Areas with no policy change and those initiating more restrictive zoning are most often in commercial areas or in areas of mixed land uses.

Table 3
STATION-AREA POLICY CHANGE/LAND USE PATTERNS

	Less Restrictive	More Restrictive	No Policy Change	Total Stations
Residential	2	1	1	4
Commercial	8	1	-	9
Mixed	6	6	7	19
Vacant	2	-	-	2
Total Stations	18	8	8	34

Actual development change has occurred at only 12 stations (Table 4), most of which are in areas which were already fully developed. Consequently, most of the change has involved redevelopment, as in the downtown areas of San Francisco, Oakland, Richmond, and Berkeley.

Table 4
STATION-AREA DEVELOPMENT CHANGE/DEVELOPMENT SETTING

	Development Change	No Development Change	Total Stations
Fully developed	9	18	27
Partially developed	3	4	7
Total Stations	12	22	34

Not surprisingly, much of the new development has occurred in commercial/retail land use areas (Table 5), near downtown BART stations. There was some new development in areas of mixed land uses (Lake Merritt and Walnut Creek) and in areas which previously were largely vacant (Union City and Fremont).

Table 5
STATION-AREA DEVELOPMENT CHANGE/LAND USE PATTERNS

	Development Change	No Development Change	Total Stations
Residential	-	4	4
Commercial	8	1	9
Mixed	2	17	19
Vacant	2	-	2
Total Stations	12	22	34

Actual development change has most often occurred where policies have been altered to induce development (Table 6). No change in development occurred at a large majority of the sites with more restrictive zoning or no policy change.

Table 6
STATION-AREA DEVELOPMENT CHANGE/POLICY CHANGE

	Development Change	No Development Change	Total Stations
Less restrictive	9	7	16
More restrictive	1	7	8
No policy change	2	8	10
Total Stations	12	22	34

In summary, 12 station areas have experienced both development change and policy change, 14 have had policy change only, and 8 have experienced neither. These changes, along with land use and development status, are shown in Table 7.

Fully developed, downtown commercial areas near BART stations have been sites of nearly all of the development change that has taken place around BART stations. These changes range from construction of two buildings near the downtown Berkeley station to intense high-rise development near the downtown San Francisco stations. In most instances, this development was encouraged by new zoning policies.

In urban areas fully developed for residential and mixed residential/commercial uses, no new development has occurred except near the Lake Merritt station (a mixed-use area near downtown Oakland), where development includes cultural and educational facilities as well as BART headquarters. In most of these areas, either no policy changes occurred or more restrictive policies were adopted, although five of the 18 areas in this group did initiate less restrictive zoning policies.

Five of the seven suburban (i.e., partially developed) station areas adopted less restrictive zoning, and the remaining two had no policy changes. All suburban BART sites are residential or mixed residential/commercial in land use character. Mixed-use development has occurred at three suburban sites; this includes one 10-story office building (Walnut Creek), shopping/cultural/community complexes (Union City and Fremont), and single/multi-family housing. Each of these developing sites has designated areas near BART for intensive development.

Table 7
DEVELOPMENT SETTING AND CHANGE

STATION	LAND USE*				DEVEL-OPMENT SETTING*		DEVELOP-MENT CHANGE 1965-1975	POLICY CHANGE (1965-1975)		
	Residential	Comm.	Mix	Vac.	Full	Part		Less Restrictive	More Restrictive	None
Concord			X		X			X		
Pleasant Hill	X					X		X		
Walnut Creek			X		X		X	X		
Lafayette			X		X					X
Orinda			X		X					X
Rockridge			X		X				X	
Richmond		X			X		X	X		
El Cerrito del Norte			X		X					X
El Cerrito Plaza			X		X				X	
North Berkeley	X				X					X
Berkeley		X			X		X		X	
Ashby			X		X					X
Fremont				X		X	X	X		
Union City				X		X	X	X		
South Hayward	X					X				X
Hayward		X			X					X
Bayfair			X		X					X
San Leandro			X		X					X
Coliseum			X		X					X
Fruitvale			X		X					X
Lake Merritt			X		X		X	X		
MacArthur			X		X					X
19th Street		X			X		X	X		
12th Street		X			X		X	X		
Oakland West			X		X					X
Daly City	X				X					X
Balboa			X		X					X
Glen Park			X		X					X
Mission-24th			X		X					X
Mission-16th			X		X				X	
Civic Center		X			X		X	X		
Powell		X			X		X	X		
Montgomery		X			X		X	X		
Embarcadero		X			X		X	X		

* Predominant land use patterns and development setting are essentially the same for 1965 and 1975 around all of the BART Stations.

Table 8
SUMMARY OF STATION AREA CHANGES (1965-1975)

Station	Policy Change	New Development
RICHMOND LINE		
Richmond Station	Adjacent to 107-acre redevelopment project.	Government office (Social Security) and high-rise residential project built; proposed retail, medical center, transportation center, and additional housing.
El Cerrito - del Norte	None.	None.
El Cerrito Plaza	Initial residential upzoning, but later downzoning.	Minimal.
North Berkeley	Zoning downgraded from apartments to duplex.	None.
Central Berkeley	More restrictive regulations (height, floor area ratio, parking).	One high-rise office building and a one-story bank.
South Berkeley (Ashby)	None.	None.
CONCORD LINE		
Concord Station	1972 Central Area Plan; area around station planned for high-density residential and office from single-family residential uses.	None.
Pleasant Hill	1976 General Plan; area around station planned for office and multi-family from single-family residential uses.	None.
Walnut Creek	1976 Core Area Plan; from single-family residential area around station to planned mixed office/retail/multi-density residential uses.	One ten-story office building across street from station.
Lafayette	None.	None.
Orinda	None.	None.

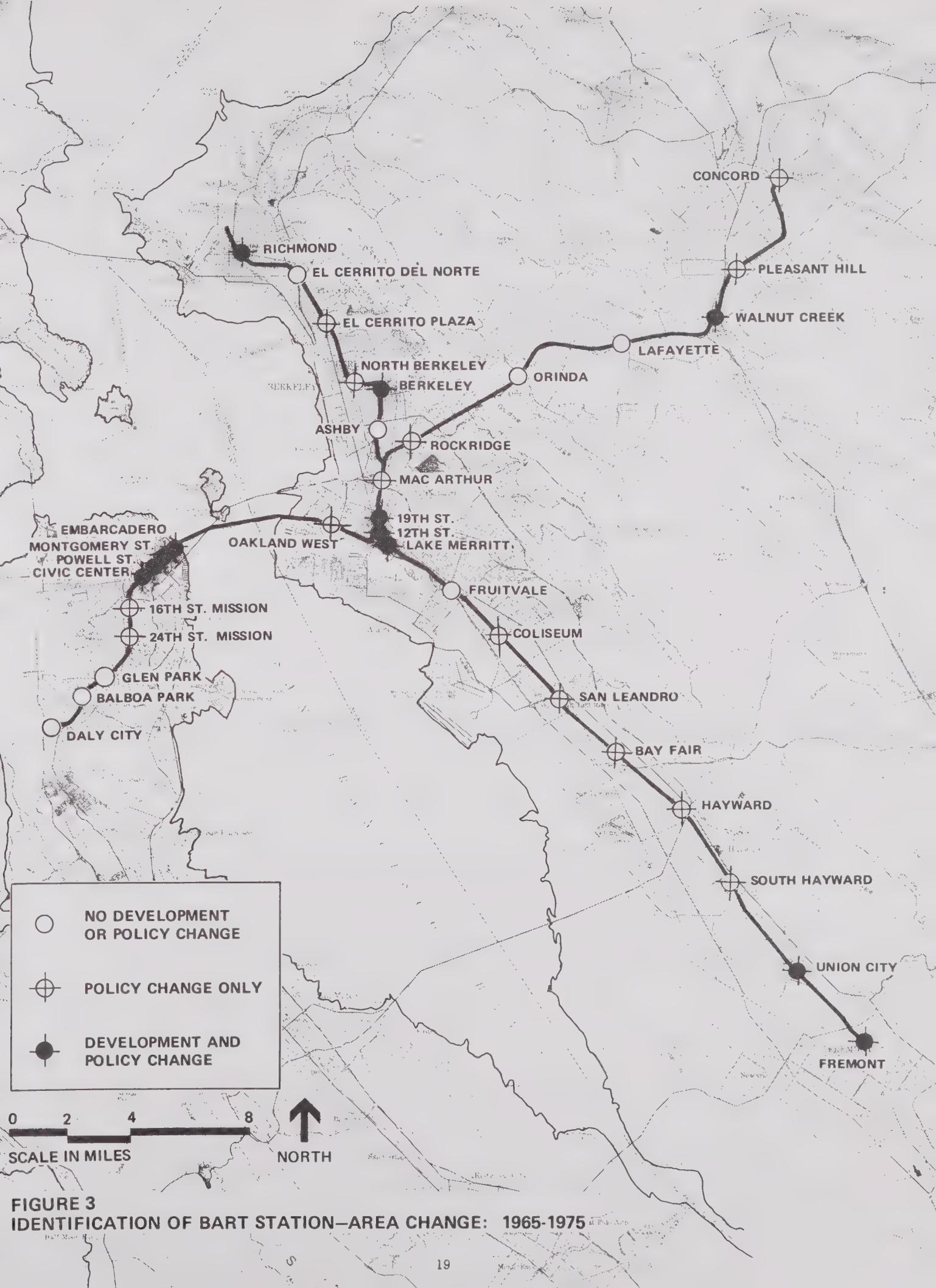
Table 8 (continued)

SUMMARY OF STATION AREA CHANGES (1965-1975)

Station	Policy Change	New Development
FREMONT LINE		
Fremont	Late 1960s adopted Central Area Plan; CBD south of station; high-density residential north of station.	Regional shopping center, hospital, retail.
Union City	Area designated CBD.	Park and community center complex; community shopping center.
South Hayward	Zoned for commercial and high-density residential.	Minimal.
Hayward	1973 zoned to Central City District; office, retail, residential.	None.
Bayfair	1966 Rapid Transit Zone created; residential development of 30-45 dwelling units per acre.	Minimal.
San Leandro	1966 Rapid Transit Zone created around station; residential density of 30-45 dwelling units per acre.	None.
OAKLAND		
Coliseum	Zoning changed from industrial to residential to conform with existing single-family use.	None.
Fruitvale	None.	None.
Lake Merritt	High-density residential zoning.	Laney College, City Museum, BART headquarters, park.
Rockridge	In 1974, College Avenue downzoned to less intensive commercial; residential area downzoned.	None.
MacArthur	Area immediately next to BART left as multi-residential; surrounding area downzoned to single-family to correspond with actual uses.	None.

Table 8 (continued)
SUMMARY OF STATION AREA CHANGES (1965-1975)

Station	Policy Change	New Development
OAKLAND (continued)		
19th Street	Part of 1966 Central District Plan for intensified commercial uses.	Several banks, telephone building, and Blue Cross office building.
12th Street	Part of redevelopment area; part of 1966 Central District Plan.	City Center Project (office and retail); housing rehabilitation.
West Oakland	Rezoned to coincide with use, in some cases industrial to residential.	Regional U. S. Postal Service Center (planned before BART).
DALY CITY LINE		
Daly City	None.	None.
Balboa Park	None.	None.
Glen Park	None.	None.
24th Street	Zoning change from commercial to residential.	None (more vacancies).
16th Street	Height limits increased and more restrictive parking structure policy.	None (more vacancies).
DOWNTOWN SAN FRANCISCO (FOUR STATIONS)		
- Civic Center - Powell - Montgomery - Embarcadero	More restrictive policies regarding provision of parking space and less restrictive policies regarding height limits.	Average growth rate of office space has been 1.3 million square feet annually since 1960.



CHAPTER 4. STATION-AREA CHANGES AND CASE STUDIES

Chapter 4 identifies station-area changes throughout the system and discusses the changes and resulting impacts for the 12 BART station areas where notable development changes have occurred since 1965. As mentioned earlier, all changes within one-fourth to one-half mile of BART stations are identified, whether or not BART appears to be a factor in their occurrence. In the 12 case study sites, development changes are at least partially attributable to BART's presence. Where possible, these connections are discussed, although the actual degree of BART's influence remains unknown in all cases.

Figure 3 is a BART system map keyed to show where changes in policy and/or development have occurred in BART station areas. This map is followed by Table 8, which summarizes the nature of the changes in each station area where they took place.

The pattern of station-area change currently most evident is the development of commercial uses in downtown areas (San Francisco, Oakland, Richmond, and to a smaller extent Berkeley). Outlying suburban areas have tended to establish zoning changes along with limited or no new development. The suburban areas which have experienced development are all within newly designated core or CBD zones.

Twelve station areas where policy change occurred along with notable development change were studied to determine the impacts of these changes. The changes are detailed and their impacts discussed in the sections which follow.

The four downtown San Francisco station areas (Embarcadero, Montgomery, Powell and Civic Center) have experienced the most dramatic development changes; these four station areas are discussed as one in the first part of this chapter. Similarly, discussion of Oakland's downtown stations (12th and 19th Streets) is combined, and the Lake Merritt station area is discussed separately within the Oakland section. Subsequent sections discuss changes and impacts in the urban sites of Richmond and Berkeley and in the suburban sites of Walnut Creek, Union City and Fremont.

SAN FRANCISCO

Downtown San Francisco, the principal destination point of BART, has experienced intensive high-rise development since the early 1960s. This portion of the report describes those changes and assesses their environmental impacts. First, the setting in terms of land uses and zoning around each of BART's four downtown stations is described. This is followed by data on downtown office space and the physical character of the new buildings. The office space is then related to numbers of office workers, which in turn is related to possible transportation changes. Finally, the impacts of the changes are discussed.

Zoning and Land Uses Around BART Stations

There are four BART stations along Market Street in downtown San Francisco; Embarcadero, Montgomery, Powell, and Civic Center. Table 9 indicates major land uses and zoning characteristics adjacent to each of the stations.

Table 9
BART STATION AREA LAND USES AND ZONING¹

Station	Predominant Land Uses	Zoning ²
Embarcadero	Office, retail, hotel & park; adjacent to Golden Gateway redevelopment project.	Zoned for downtown office (C-3-O) and support (C-3-S); FAR 14:1
Montgomery	Office & commercial; heart of finance & administration area; near downtown retail area & Yerba Buena redevelopment project.	Zoned for downtown office (C-3-O) and support (C-3-S); FAR 14:1
Powell	Hotels, theaters; some high-density residential, commercial and office; near Yerba Buena redevelopment project.	Zoned for downtown general commercial (C-3-G) and downtown retail (C-3-R); FAR 10:1
Civic Center	Institutional (federal, state, city government offices), general commercial, theater, museum & exhibition hall, and high density residential; area characterized by older buildings with substantial vacant space.	Zoned for general commercial (C-3-G), downtown support (C-3-S); FAR 10:1

¹ Source: Development Around BART Stations, Office of Planning, Bay Area Rapid Transit District, May 1973.

² In 1968, San Francisco enacted a zoning ordinance which divided the downtown area into four zoning districts or functional areas: downtown office, downtown retail, downtown general commercial and downtown support. Each district had a basic FAR (floor area ratio) which could be exceeded through a bonus system related to proximity or direct connection to BART; e.g., a site with a basic FAR 14:1 can increase up to 20 percent if a direct entranceway to BART is provided. For locating a new building within 750 feet of BART, a 10 percent bonus can be gained. No parking is required in many of the districts (except for residential uses), and a maximum of 7 percent of the building's gross floor area is permitted for use as parking.

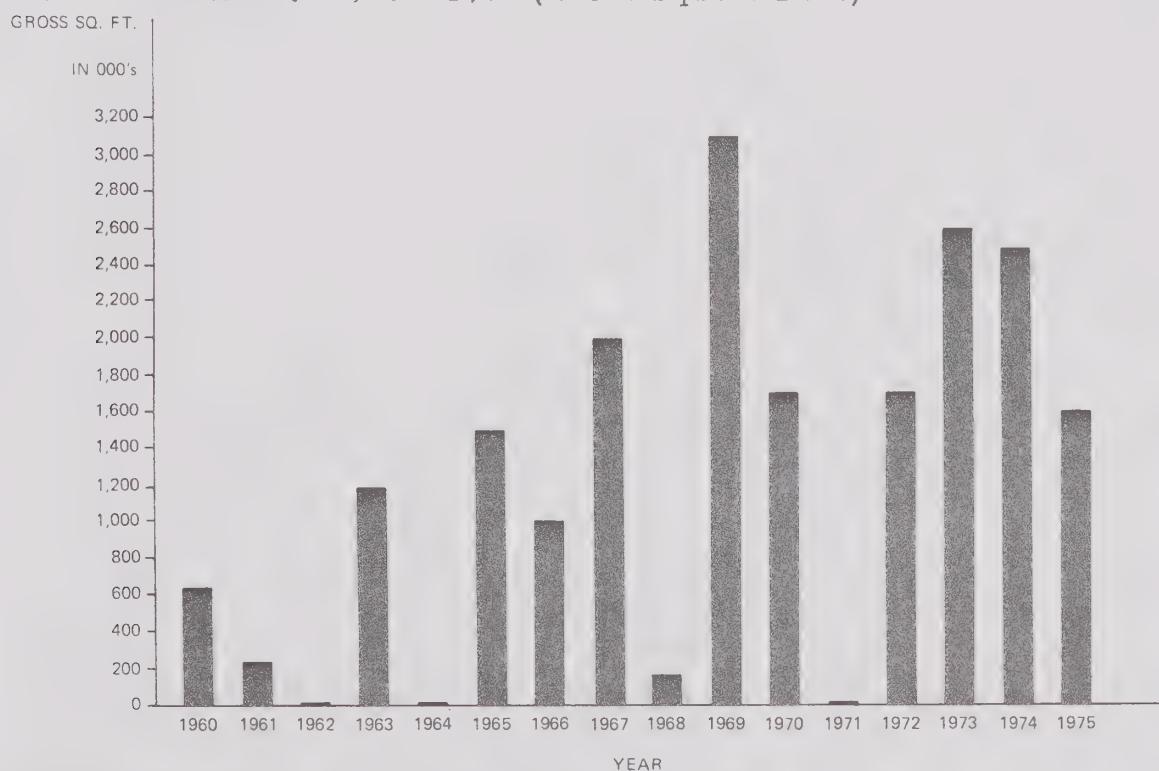
Central Business District Office Growth¹

San Francisco now ranks as one of the nation's leading office centers. As of 1975, there were more than 50 million gross square feet in downtown office space, including nearly 36 million gross square feet in major downtown buildings² of 10 stories or more.

From 1960 to 1975, the construction of 39 major office buildings added 20.8 million gross square feet to San Francisco's downtown office space. This is an average growth rate of 1.3 million gross square feet per year. Figure 4 represents the amount of growth by year. Aerial photographs of the four downtown BART station areas taken in 1965 and 1975 (Plates 1 through 8) display the physical dimensions of this growth.

Figure 4

MAJOR OFFICE BUILDINGS CONSTRUCTED IN DOWNTOWN SAN FRANCISCO: 1960 - 1975 (Gross Square Feet)



¹ CBD office growth data drawn primarily from: Commerce and Industry--Commercial Trends (San Francisco City Planning Department, 1975).

² Office growth trends in this report are based on the construction of major office buildings with a height of at least 10 stories. Collectively, these buildings account for more than 80 percent of total office space growth.

Thirteen major office buildings are currently under construction or proposed for completion by 1980.¹ These buildings will add another seven million gross square feet to the downtown office space inventory.

The post-1960 buildings are dramatically different from those built before 1960. From 1945 through 1959, 13 major office buildings averaging 14 stories and 225,000 gross square feet were constructed. In contrast, the 39 newer buildings range in height from 10 to 52 stories and average 26 stories and 534,000 gross square feet per building. The new buildings are concentrated in a small area (approximately one square mile) around the base of Market Street, within 3 to 4 blocks of the Embarcadero and Montgomery BART stations (Figure 5).

San Francisco's dramatic growth in commercial development over the past 15 years is reflected in striking physical and economic changes. The building valuation of San Francisco's commercial development since the early 1960s is approximately 1-1/4 billion dollars.² During this period, San Francisco not only captured an increasing absolute amount of commercial development as reflected in building permit valuation, but also an increasing share relative to the nine-county region and the five-county SMSA (Table 10). Over the years 1962-1974, San Francisco's average share of issued permit value was 33 percent for the nine-county region and 45 percent for the five-county SMSA. For the years 1965-1971 its share was above these averages. Since 1972, San Francisco's relative share has dropped dramatically.

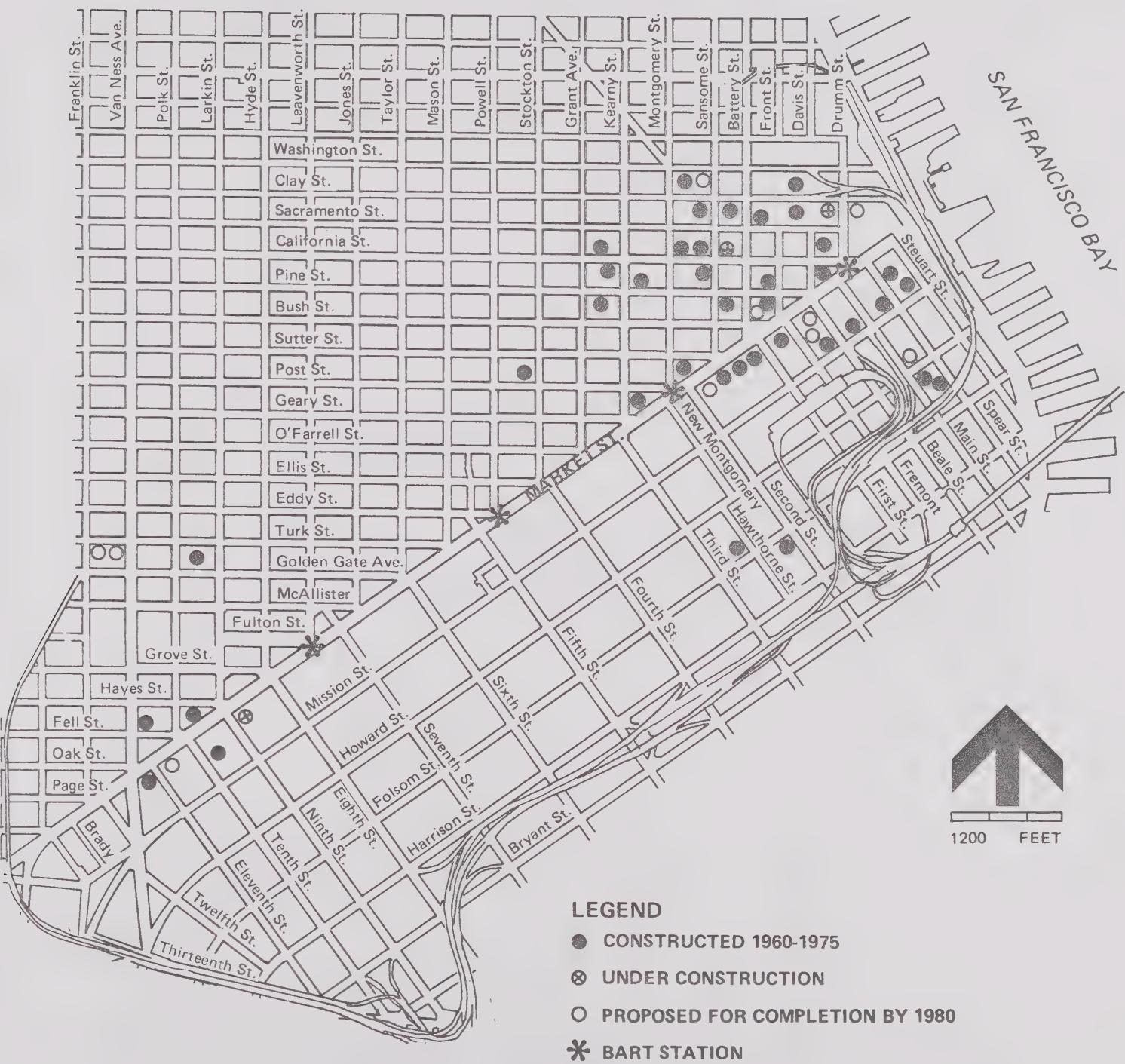
In 1968, the City of San Francisco introduced building bonus provisions allowing a maximum 10 percent increase in allowable floor area ratio for buildings within 750 feet of a BART entrance or a maximum 20 percent increase for those with entranceways directly into BART stations. While most new downtown buildings are within the 750-foot range, it cannot easily be estimated how many have taken advantage of the BART-related bonus, because other bonus provisions were also available to builders (e.g., for parking access, multiple building entrances, sidewalk widening). Only a few (3 or 4) buildings provided direct entrances to BART stations. Many developers felt direct entranceways added to a building's security problems.

¹ Yerba Buena redevelopment project is not considered here due to the uncertainty of its composition. The latest recommendation for the site, which was approved by San Francisco voters in 1976, calls for a convention center to be built within the central blocks of the redevelopment area. It is proposed that the facility be placed underground and that an urban theme park (similar in concept to Copenhagen's Tivoli Gardens) be placed on top of the convention facility.

² Based on recorded valuation of building permits issued from 1962 through 1974. Source of this information was Security Pacific Bank's Research Department.

Figure 5

LOCATION OF MAJOR DOWNTOWN OFFICE BUILDINGS¹
CONSTRUCTED 1960-1975 AND PROPOSED FOR COMPLETION BY 1980



¹ Buildings or portions of buildings with a height of at least 10 stories or 118 feet.

Table 10
SAN FRANCISCO BUILDING PERMIT VALUATION, 1962-1974

Year	Valuation of Building Permits Issued - S.F.	Percent of 9-County Region	Percent of 5-County SMSA
1962	\$ 28,452,000	22%	34%
1963	44,946,000	30%	45%
1964	39,872,000	26%	38%
1965	69,752,000	35%	46%
1966	106,361,000	41%	50%
1967	94,384,000	44%	58%
1968	93,148,000	41%	55%
1969	115,284,000	36%	46%
1970	93,356,000	36%	57%
1971	317,187,000	61%	71%
1972	43,566,000	17%	26%
1973	90,549,000	28%	43%
1974	49,345,000	16%	25%

Source: Security Pacific Bank, Research Department

CBD Related Employment

Corresponding to the increase in office space, there has been a sharp increase in office workers. According to a report prepared for SPUR,¹ CBD office workers increased in number by 71,000 during the period from 1960 to 1974 (Table 11).

Table 11
EMPLOYMENT CHANGE IN THE SAN FRANCISCO CENTRAL BUSINESS DISTRICT, 1960-1974

Year	CBD Office Workers
1960	115,000
1965	137,000
1970	169,000
1974	186,000

Source: SPUR, Impact of Intensive High Rise Development on San Francisco. NOTE: Estimated workers based on assumed rates of building efficiency, vacancy and space for workers. For example, in 1974 estimate based on 50.0 million square feet of CBD office building space, 80% building efficiency, 7% vacancy and 200 square feet per worker.

¹ San Francisco Planning and Urban Renewal Association (SPUR), Impact of Intensive High Rise Development on San Francisco (San Francisco, California, June 1975).

Based on the same set of assumptions used to derive the 1974 estimate, construction completed in 1975 would result in approximately 6,000 additional workers to bring the 1975 total to 192,000 CBD office workers. Continuing with the same assumptions, the seven million gross square feet under construction or proposed would bring an additional 26,000 workers, or a total of 218,000 workers to the central business district by 1980.

Transportation

Many transportation systems converge in downtown San Francisco. BART brings passengers from the East Bay area as well as from outlying parts of the city itself. Public bus transit systems from Marin County (Golden Gate Bridge, Highway and Transportation District) and from the East Bay (Alameda-Contra Costa Transit District) bring riders to the Transbay Transit Terminal in downtown San Francisco. In addition, Southern Pacific Railroad serves commuters from the southern Bay Area (Santa Clara and San Mateo counties) and Greyhound Bus Lines serves the East Bay and southern areas. The Municipal Railway of San Francisco (Muni) provides a well-developed system of bus and trolley service within the boundaries of the city.

Based on the estimated increase in CBD office employees as of 1975, about 12,000 vehicles have been added to CBD traffic since 1960.¹ Screenline data was not available to indicate the total number of vehicles entering or exiting the CBD, either for 1960 or currently. The only information available was traffic counts (Table 12) taken between 1963 and 1976 on a few specific streets.

¹ Estimate of new vehicles based on a mode split of 72 percent and 28 percent in favor of transit and on a vehicle occupancy rate of 1.4. The mode split figure comes from SPUR, based on a survey of office workers; the vehicle occupancy figure is from Caltrans, District 4.

Table 12

SELECTED SAN FRANCISCO AVERAGE DAILY TRAFFIC COUNTS, 1963-1976

Location	'63-'65	'69-'73	'75-'76
Fremont, so. of Market	11,118	8,076	8,318
1st St., so. of Market	9,794	11,615	11,614
2nd St., so. of Market	9,607	2,980	3,769
3rd St., so. of Market	17,651	18,066	19,487
4th St., so. of Market	17,120	17,100	13,040
5th St., so. of Market	14,599	11,080	14,694
6th St., so. of Market	15,381	21,000	18,561
Mission, w. of 4th	--	21,329	18,318
Howard @ 2nd & 4th	13,299	14,328	16,052
Montgomery @ California	13,850	14,299	11,657
Kearny @ Post	14,133	21,662	18,513
Pine @ Mason	--	9,152	11,887
Bush @ Mason	14,469	19,885	18,695
Post @ Mason	12,296	10,501	12,594

Source: S.F. Dept. of Public Works, Bureau of Engineering,
Division of Traffic Engineering

By these counts, there was an increase in total volume for the sample streets of about 3,500 vehicles, or approximately 2-1/4 percent. This is consistent with the estimated 12,000-vehicle increase for the entire CBD area. Nearly as many of the sample streets have decreased in volume as have increased in volume. On certain streets the changes are particularly notable. For example, at 2nd Street just south of Market, there was a volume drop of nearly 60 percent, while at Kearny and Post Streets there was an increase of over 30 percent. In these cases, change probably resulted from the lingering effects of BART construction and major high-rise building projects.

With the increasing number of automobiles, there has been a corresponding increase in off-street parking spaces, as shown in Table 13.

Table 13

DOWNTOWN SAN FRANCISCO OFF-STREET PARKING INVENTORY
(1948-1975)

Year	Off-Street Parking Spaces
1948	20,000
1965	50,000
1975	65,000

Source: S. F. Department of Public Works, Bureau of Engineering, Division of Traffic Engineering

Much of the increase in parking facilities from 1965 to 1975 occurred within the Yerba Buena redevelopment project, where extensive surface lots are "temporary" land uses until the project's major construction efforts get underway. Virtually no surface-lot parking occurs north of Market Street, but a number of multilevel parking structures have been built in this area. The area south of Market Street contains numerous surface lots as well as parking structures.

Muni has not substantially changed its service (in terms of additional routes or equipment) to the CBD in the past 10 to 15 years. While no specific figures were available for CBD patronage, citywide Muni patronage remained at a constant level throughout the 1960s, but declined rather sharply in the early 1970s (prior to BART service) as a probable consequence of an increase of the system's fares. For the last three to four years, patronage has been at a constant level. It is likely that many of the new workers commute from suburban areas rather than from San Francisco proper. This is borne out by increases in public transit patronage from Marin County, from the East Bay counties of Contra Costa and Alameda and from the peninsula to the south of San Francisco.

As of June 1977, total daily BART patronage was nearly 47,000 exits from the four downtown San Francisco stations.¹ This represents approximately one-third of the daily total for the entire BART system and is indicative of the extent to which the system activity is focused on the downtown San Francisco area.

¹ For an average day in June, 1977, there were approximately 137,000 one-way trips on the BART system. This is commonly referred to as BART's daily patronage.



Plate 1
EMBARCADERO STATION: 1965



Plate 2
EMBARCADERO STATION: 1975



Plate 3
MONTGOMERY STREET STATION: 1965



Plate 4
MONTGOMERY STREET STATION: 1975



Plate 5

POWELL STREET STATION: 1965



Plate 6
POWELL STREET STATION: 1975



Plate 7
CIVIC CENTER STATION: 1965



Plate 8
CIVIC CENTER STATION: 1975

Impacts

The extensive new commercial office development in downtown San Francisco has induced changes in the environment, affecting the sound levels, climate, air quality and visual attributes of the city. These effects and the subjects of energy supply, safety/security and geologic hazards in the area are discussed in subsequent sections. The discussion is based on a review of all current environmental impact reports prepared for buildings proposed or recently constructed in downtown San Francisco and on other documents directly related to the city's environment. Especially useful was SPUR's Impact of Intensive High Rise Development on San Francisco.¹ It provided much of the data on development changes per se as well as on their impacts.

This environmental impact assessment is based on all of the commercial office space development that has occurred in downtown San Francisco between 1960 and 1975. The impacts actually induced by the presence of BART are virtually undefinable and inseparable from the impacts of all downtown development during the period. In general, each building constructed has one of the following relationships to BART:

- The development would have taken place in San Francisco if BART did not exist (impacts not BART-induced).
- The development would have taken place somewhere in the region if BART did not exist, but BART was one of many factors which brought it to downtown San Francisco (partially BART-induced transfer of impacts within the region).
- The development occurred in downtown San Francisco primarily because of BART's presence (truly BART-induced impacts).

Because these relationships are very difficult to measure and because the dense new development in downtown San Francisco is more effectively approached as a single entity, no attempt was made to determine the quantity and quality of specifically "BART-induced" impacts.

¹ San Francisco Planning and Urban Renewal Association (SPUR), Detailed Findings, Impact of Intensive High-Rise Development on San Francisco, Final Report (June 1975).

Acoustics

There are two principal noise sources attributable to building development. One is building construction; the other is the motor vehicle traffic generated by increased activity once construction is completed.

Construction Noise

Construction noise has been a continuous fact of life in downtown San Francisco for over fifteen years. From 1960 to 1975, 39 major office buildings were constructed, the majority concentrated in an area around the foot of Market Street. BART construction added significantly to the noise level during much of that period. The combined (BART and offices) construction noise has impacted workers in buildings, pedestrians and motorists by interfering with phone calls, conversations and radio-listening.

Specific construction activities associated with the highest levels of noise include:

- Demolition of old structures occupying new building sites;
- Excavation work for the new buildings (sometimes intensified by pile driving);
- Use of heavy trucks for hauling away dirt and debris and delivering construction materials;
- Riveting as part of the construction process.

The City of San Francisco controls construction noise levels through an ordinance¹ which limits construction noise levels to a maximum of 85 dB(A) at a distance of 100 feet from the construction site. However, impact tools such as those used in pile driving are not subject to the maximum level restriction, but must use intake devices and mufflers. Nighttime construction activities are restricted to noise levels within 5 dB of ambient levels. This may be exceeded only when a special permit is issued by the city.

¹ San Francisco Noise Abatement and Control Ordinance.

Traffic-Generated Noise

Vehicular activity (autos and buses) is the dominant source of ambient noise levels in an urban area. In 1974, a study of noise in San Francisco¹ found that sound levels in the downtown area ranged from an L_{dn}^2 of 65 dB to an L_{dn} of 80 dB. The highest levels are near busy transportation arteries, such as freeways, Van Ness, Lombard, Park Presidio and Marina Boulevard. It was found that the noise level along a street is generally proportional to the logarithm of the traffic flow rate; if the traffic increases by a factor of 10 (e.g., from 1,000 vehicles to 10,000), the noise level will increase by 10 dB. A 10 dB increase is perceived as a doubling of the noise level. Away from main streets noise levels are 5-10 dB less because of the shielding provided by buildings. Figure 6 indicates noise levels as developed in the 1974 study for streets in the downtown area.

Comparable area-wide earlier data was not available, so it is difficult to estimate the extent to which sound levels in the central business district have changed. However, there are traffic counts taken in 1963-65 and 1975-76 for a few street locations in the downtown area. Among these the intersection of Kearney and Post had the greatest traffic volume change, an increase of about 4,500 vehicles. Using nomographs developed by Bolt Beranek & Newman,³ this increase translates to a noise increase of approximately 2 dB for a person standing 50 feet from the center of the street. Such a change would probably not even be perceived. It has been estimated that only 12,000 vehicles have been added to the downtown area because of the new development. If this is so, the increased traffic has had little perceivable effect on noise levels. An absolute increase in noise level has almost certainly not occurred because of the increasing quietness of automobiles manufactured in recent years, a trend that should continue through the 1980s.

According to the 1974 BBN study, the "canyon effect" of the new development does not cause a significant increase in measured sound level; measurements taken on streets of similar vehicular activity, but varying amounts of development, were recorded as having approximately the same sound levels. However, sound levels in areas of intense high-rise development may be perceived as greater due to the presence of a time-delayed echo of sound from a particular source. This singular reflection or echo does not add significantly to the overall measured sound level.

¹ Bolt Beranek and Newman, Inc., Noise in San Francisco (prepared for the Department of City Planning, City and County of San Francisco, July 1974).

² L_{dn} represents the energy average of the noise level over a 24-hour period with a weighting factor of 10 decibels added to the nighttime noise levels.

³ BBN, Noise in San Francisco.



Figure 6
DOWNTOWN SAN FRANCISCO
NOISE MAP

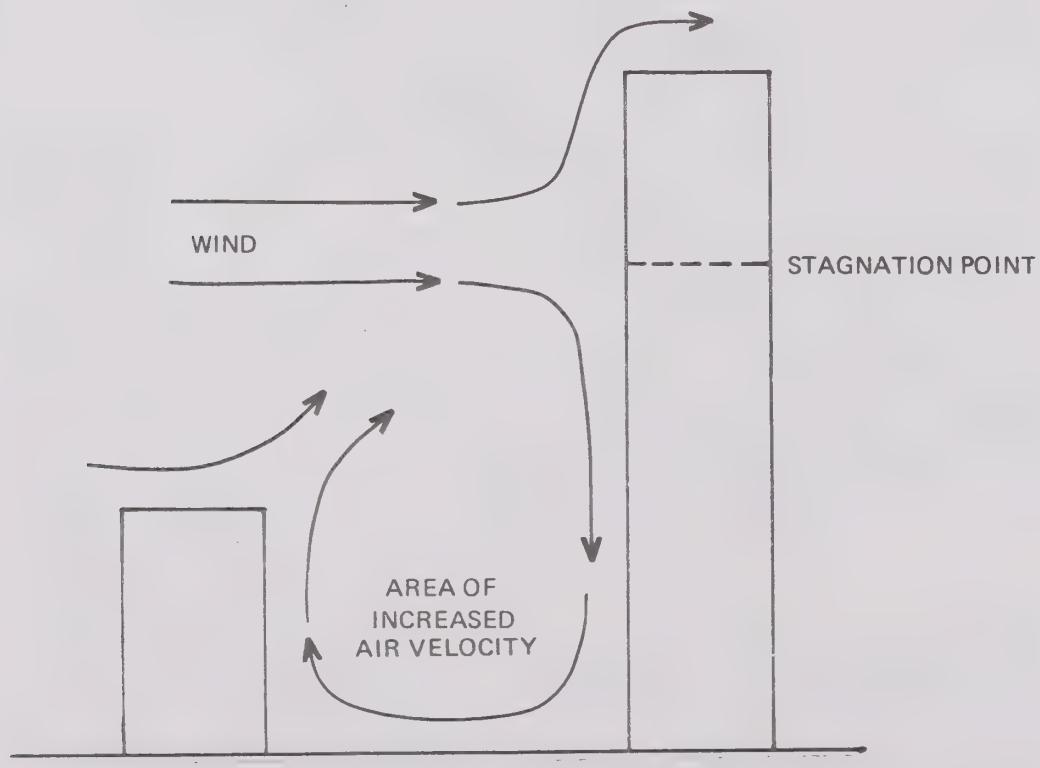
Source: *Noise in San Francisco*, a report prepared by Bolt Beranek and Newman Inc. for the Department of City Planning, City and County of San Francisco, July 1974.

Meteorology (wind and temperature)

The new high-rise office buildings in downtown San Francisco cause a deflection of upper winds down to the sidewalk level. The degree of discomfort caused by the increased windiness depends on meteorological conditions (e.g., wind speed, temperature, etc.) and on the size and shape of the buildings nearby. Site-specific measurements were not taken as part of this study, but from review of various environmental impact reports and an extensive analysis by SPUR,¹ it is clear that the wind impact on pedestrians is one of the most critical direct impacts of the new development.

High-rise buildings increase wind levels around their bases by diverting upper altitude winds (which are generally of higher velocity than lower altitude winds) down to ground level. Where a short building is immediately upwind of a taller building, a low-pressure area in its wake induces downward winds to flow away from the taller building towards the short one. These winds are faster than if the low building were not present, creating a high-speed vortex between the buildings (Figure 7). The magnitude of the increased wind speeds in such a situation is dependent upon the building heights, the width of the taller building and the distance between buildings.

Figure 7
WIND FLOWS BETWEEN TWO BUILDINGS



¹ SPUR, Detailed Findings

Pedestrians experience particularly forceful winds at corners of the tall buildings and within arcades or throughways. The force of winds coming around building corners can be up to 2-1/2 times greater than that of unobstructed winds. Winds passing through an arcade can increase three-fold in force.

Winds also affect walking conditions and cause a lower air temperature. Winds of 10 mph can be annoying to pedestrians (disturbing hair and clothing, blowing dust and papers about). Winds of 25 mph and 35 mph can make walking difficult. The wind chill effect on temperatures is usually perceived as undesirable, because San Francisco's climate is already on the cool side. Winds of 10, 25 and 35 miles per hour can reduce a temperature of 56° (the average San Francisco temperature) to an effective temperature of 46°, 39° and 37° respectively.

Air Quality

An indirect method for assessing the air quality impact of recent development in downtown San Francisco is to compare air quality data before and after the advent of the development. As part of its regional air quality monitoring network, the Bay Area Air Pollution Control District (BAAAPCD) has an air quality measurement station at 939 Ellis Street, near the central business district. Data collected there have been summarized by the California Air Resources Board and its predecessor, the Bureau of Air Sanitation.¹

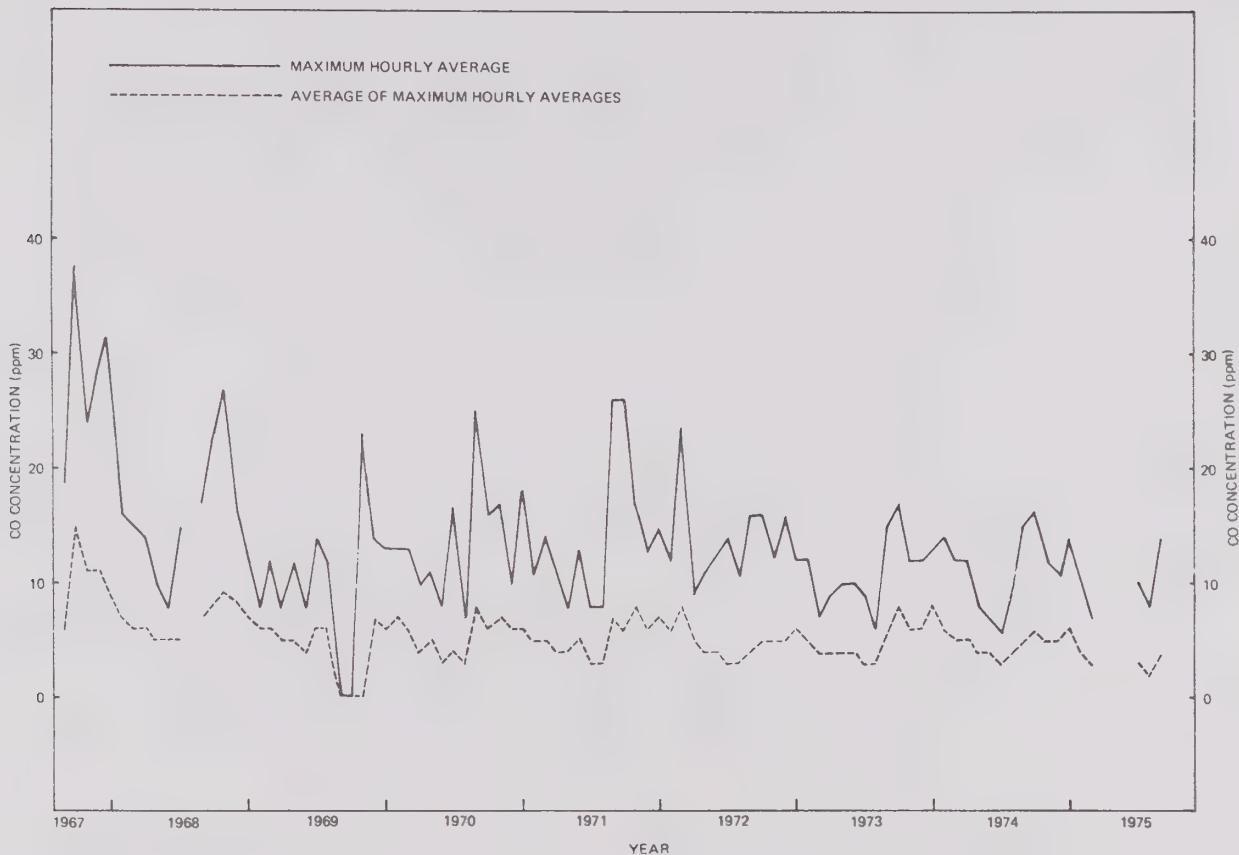
As with the Phase I measurement of BART's direct impact on localized air quality,² carbon monoxide (CO) was selected as the pollutant of interest. Figure 8 shows two plots of CO levels in San Francisco for the period from 1967 through 1975. The upper line in the figure represents the single highest hourly values of CO measured each month. The lower line represents the average of the daily hourly maxima for a given month. The CO levels tend to be highest during the months of September through January.

¹ State of California Air Resources Board, "California Air Quality Data," Vol. 1, No. 1, Sept.-Nov. 1968 through Vol. VII, No. 3, July-Sept. 1975. State of California Department of Public Health, Bureau of Air Sanitation, "The Clean Air Quarterly," Vol. 12, No. 1, Sept.-Nov. 1967 through Vol. 12, No. 41, June-Aug. 1968.

² TRW Inc., Impacts of BART on Air Quality: Interim Service Findings. Document No. DOT-BIP-WP 20-4-76 (Berkeley: Metropolitan Transportation Commission, March 1976).

Figure 8

HISTORICAL CARBON MONOXIDE TRENDS: SAN FRANCISCO, 1967-1975



As shown in Figure 8, the overall CO levels have steadily diminished in spite of the considerable development and increasing vehicular activity in downtown San Francisco. The major reason for this downward trend is implementation of stringent automotive exhaust controls,¹ which have far outweighed any negative impact of new development on air quality. With more stringent emission controls projected through the mid-1980s, improvement in air quality should continue. Effects of new development on localized air quality are expected to be minimal.

In general, tall buildings contribute to greater site-specific pollution during still periods, but help cleanse the air when winds are blowing. The dispersion of emissions is affected by wind velocity and building

¹ U. S. Environmental Protection Agency and California Air Resources Board regulations limit new car CO emissions to 1.8 grams per mile beginning in 1977, compared to 1965 emissions, which were 87 grams per mile.

configuration. A canyon effect occurs when light winds circulating between tall buildings compress and trap air pollutants near street level. This effect is countered, however, by increased wind speeds around the base of the buildings (see Meteorology), which tend to flush pollutants.

Visual Effects

The major visual effects of San Francisco's downtown high-rise office buildings are:

- Creation of views;
- Obstruction of views;
- Limitation of spaciousness;
- Reduction of natural light (cast shadows).

The new high-rise buildings sometimes create view opportunities for persons inside and thus provide visual benefits. However, they also obstruct views which were enjoyed before the buildings existed, becoming a visual liability. No attempt has been made in this study to quantify the net change in view opportunities, although it appears that view opportunities have been increased for people working in downtown offices. The SPUR report,¹ however, indicates that increased rates of view obstruction occur as the height and density of new development increase.

From the perspective of the pedestrian, high-rise buildings cause a sense of environmental constriction and reduce the amount of light which reaches the street.² The perceived limitation of spaciousness in the downtown area can be inferred from results of a survey done for the SPUR study. In response to a question on characteristics most disliked about the commercial area, lack of open space was one of the most frequent responses. The same survey found that the most preferred vantage point for viewing high-rise buildings was "from far away", while the view most disliked was "from street level."

The effect of shadows has been increased by the characteristics of the new buildings. They are higher and bulkier than the older buildings, and they

¹ SPUR, Detailed Findings.

² Shadows also affect temperatures, which are discussed in the Meteorology section.

are concentrated in a very small area. These factors have created an area which receives very little bright daylight at the street level, a disbenefit for the pedestrian. San Francisco is frequently overcast, which makes the shadow effect seem even more oppressive on a day of bright sunlight.

An urban design plan¹ has been in effect in San Francisco since 1971. A number of policies contained within the document are intended to guide public and private decisions about major new development. The following policies are general guidelines for the visual attributes of new development:

- Promote harmony in the visual relationships and transitions between new and older buildings.
- Avoid extreme contrasts in color, shape and other characteristics which will cause new buildings to stand out in excess of their public importance.
- Promote effects to achieve high quality of design for buildings to be constructed at prominent locations.

The new downtown buildings vary in their compliance with the policies (Plate 9). They are concentrated in one area, forming their own distinct high-rise district. For the most part they are neutral in color, rectilinear in shape, and generally are of good design quality. On the other hand, they have tended to overwhelm smaller-scaled buildings, obstruct views and keep sunlight from reaching ground level. They have enhanced the city skyline as seen from a distance, but have reduced visual opportunities for persons in their immediate vicinity.

Energy (water, gas and electricity)

One of the direct consequences of the new development is a considerable increase in the water, gas and electricity demands of downtown San Francisco. The total energy needs of the new commercial office development are not easily measured, but they can be seen to represent a significant fraction of the downtown energy needs. The main effect of the increased energy demand is an added burden on the systems of energy supply in San Francisco. The new energy requirements do not represent a gross additional energy demand. The development would probably have occurred elsewhere (most

¹ Department of City Planning, The Urban Design Plan for the Comprehensive Plan of San Francisco (May 1971).



Plate 9
DOWNTOWN SAN FRANCISCO DEVELOPMENT

of it in the Bay Area) if not in San Francisco; thus the demand is the same, but concentrated in downtown San Francisco.¹

Resource consumption by the major downtown development (39 buildings) was estimated on the basis of the composite average rates used to project resource requirements for new buildings as described in a number of environmental impact reports. Table 14 displays the base estimates, the total estimated consumption of new downtown office development, and the percent of that consumption within the total for all of San Francisco.

Table 14
ESTIMATED WATER, GAS & ELECTRICITY REQUIREMENTS FOR NEW DOWNTOWN DEVELOPMENT (1960-1975)

Resource	Basis for Estimating Consumption	Estimated Consumption*	% of Total Consumption**
Water	20-30 gallons/day/employee	1-1/2-2-1/2 million gallons/day	1-2%
Gas	5-10 BTUs/hour/square foot	100-200 million BTUs/hour	less than 1%
Electricity	1-1/2-2-1/2 KWH/month/square foot	30-50 million KWH/month	10-18%

* Based on 77,000 employees and/or 20.8 million square feet of space.

** Total consumption sources: San Francisco Water Department (water); Pacific Gas and Electric Company (gas and electricity).

The demands for water and gas are relatively small fractions of the city's total consumption. However, the electrical energy requirements for the new office buildings are significant. This is borne out in figures from Pacific Gas and Electric² which indicate that between 1965 and 1975 electric

¹ Pacific Gas & Electric Company (PG&E) provides gas and electricity to the entire Bay Area, so the specific location of the new development has no effect on distribution burden among suppliers; water, on the other hand, is provided by different companies throughout the Bay Area, thereby resulting in a concentration of burden on the San Francisco Water Department.

² S. M. Andrew (PG&E) to Donald L. Graff, 30 November 1976.

energy sales to large commercial customers tripled, while the use per customer increased by less than 20 percent. It is reasonable to assume that the new office development in downtown San Francisco accounted for a large share of this increased electric energy consumption.

Safety and Security

During Phase I of the Environment Project, findings¹ indicated that traffic accidents and crime in downtown areas near BART stations had not increased significantly. Plaza areas around the BART stations are commonly used as resting areas by indigents and street people, but this did not appear to pose any particular problem to patrons or persons passing through the area.

Recent re-contact² with local police officials revealed that pedestrian and vehicle traffic safety in downtown areas has not changed significantly over the past several years. Crime and security problems have increased over the years, but not disproportionately in relation to those in other areas of the city.

Natural Hazards

Most of the new development has occurred in an area of serious geological hazards. According to the Blume report,³ the area bounded by the Embarcadero, Washington Street, Grant Avenue and Mission Street is predominantly artificial fill of silt, clay, rock waste, man-made debris and organic waste. This is the same area in which 29 major (10 stories or more) downtown office buildings have been constructed since 1960.

¹ Gruen Associates and De Leuw, Cather & Company, Impacts of BART on the Social Environment: Interim Service Findings. Document No. DOT-BIP-TM 19-4-76 (Berkeley: Metropolitan Transportation Commission, March, 1976).

² Gruen Associates and De Leuw, Cather & Company, Environmental Impacts of BART: Phase Two Addenda to Direct Impacts. Document No. DOT-BIP-WN 2-4-77 (Berkeley: Metropolitan Transportation Commission, December 1976).

³ John A Blume, San Francisco Seismic Safety Investigation (prepared for the San Francisco Department of City Planning, June 1974).

There are no active earthquake faults within the city. However, the San Andreas and the Hayward fault systems are only 7 and 12 miles respectively from the central business district area. The area of concentrated new development is categorized as subject to violent or very strong earth movement if an earthquake along one of these faults were to occur. It is theorized that such an earthquake could result in the collapse of brick and frame structures and serious cracking of better buildings in the downtown area. To help counter potential earthquake damage new construction utilizes steel-reinforced concrete piles driven deeply to reach firm support. As of 1967 new buildings are required to have a "ductile, moment-resisting frame" to allow for lateral sway in case of earth tremors.

The area is also subject to subsidence and liquefaction hazards.¹ It is interesting to note that most of the remaining sections of the downtown area (west of Grant Avenue) are on more solid ground and outside of the subsidence and liquefaction hazardous zones.

¹This material updates data in the Impacts of BART on the National Environment, DOT-BIP-TM-17-4-76 which did not include this portion of San Francisco as an area subject to liquefaction.

OAKLAND

Downtown Stations (12th and 19th Streets)

Downtown Oakland is the hub of the BART system. The 12th Street (City Center) station is the transfer point where all East Bay lines and the line to San Francisco and the peninsula converge. In June 1977, total daily exits at the 12th Street (City Center) and 19th Street BART stations were 4,700 and 5,725, respectively. The two-station total of 10,425 exits represents approximately 8 percent of the activity on the overall BART system. By comparison, the downtown San Francisco stations account for over one-third of the total system activity. Downtown Oakland has generally developed in a linear fashion along Broadway. The more economically viable portion of the CBD adjoins 19th Street, whereas, the southern portion includes many older buildings and economically marginal businesses. However, significant redevelopment activity is occurring in the vicinity of 12th Street, including office, retail, and governmental uses.

In the vicinity of the 19th Street Station, development since 1965 has included several office and bank buildings, including:

- (1) Golden West Savings and Loan
(with direct entrance to BART).
- (2) Bank of Tokyo.
- (3) Telephone Company Building.
- (4) Blue Cross Building.

The 1965 and 1975 aerial photographs indicate the comparative level of activity near the 19th Street Station (Plates 10 and 11). Upgrading of existing uses has also occurred, such as the remodeling of Capwell's Department Store.



Plate 10
19TH STREET STATION, OAKLAND: 1965



Plate 11
19TH STREET STATION, OAKLAND: 1975

Near the 12th Street (City Center) station, the primary development activity has focused on the City Center project, a 15-block, \$150 million redevelopment project combining public and private sector financing. Currently, the Wells Fargo Bank Building and the Clorox Building have been completed and comprise approximately 700,000 square feet of space. In addition, a 1,000-car garage is currently under development.

Ultimately, the City Center project will include approximately 2,000,000 square feet, including a multilevel plaza with a direct connection to BART at the mezzanine level, a regional shopping center, a hotel, and various other related facilities. If the proposed extension of the Grove-Shafter Freeway occurs, a direct connection to the City Center parking facility is anticipated.

Other redevelopment programs near the 12th Street station include a proposed convention center, the Victorian Row/Old Oakland project, and the Chinatown project.¹ Within the Chinatown project area, the Sun Yat-sen House development has been completed and includes 328 condominium residential units and 44,000 square feet of street-level commercial space.

Plates 12 and 13 depict the comparative change which has occurred between 1965 and 1975, near the City Center station. Other indications of activity changes include street traffic volumes, pedestrian volumes, and the off-street parking inventory.

Traffic count data² for the downtown Oakland station areas indicate the following:

- Near the 19th Street station, traffic volumes declined between 1967 and 1972, but returned to, roughly, 1967 levels by 1975.
- Near the 12th Street station, traffic volumes have steadily declined between 1967 and 1975.

¹ A \$100 million cultural-commercial-parking complex. The scheme of edifices includes parking for 2,000 cars, retail shopping space, a 450-room hotel, 200,000 square feet of office space, 150 apartments and an Oriental cultural center.

² Source: Oakland Planning Department.

Pedestrian activity in the vicinity of City Center declined significantly between 1950 and 1970. Since 1970, pedestrian counts have generally increased. On Broadway between 13th and 14th Streets, the increase has been significant, i.e., from 7,100 in 1970 to 10,600 in 1976.

These activity indicators, combined with the public and private sector development activity, reflect the increased vitality of the downtown area. This is particularly significant within the context of a substantial citywide decline in population, e.g., from 362,000 in 1970 to an estimated 334,000 in 1975.

The direct effect of BART on these development activities may not be significant in terms of the level of patronage activity to and from the downtown Oakland stations. However, the presence of BART was very instrumental in the City Center redevelopment project, since a significant portion of the "local share" of the project costs was in the form of non-cash credits based on the proximity to the 12th Street Station.¹

Impacts

The indirect environmental impacts in downtown Oakland are dominated by the City Center project. Impacts related to development near the 19th Street BART station are insignificant, given the low level of development activity and the fact that such development represents replacement buildings. Furthermore, the potential future impacts near the 19th Street station are unlikely to be significant. Impacts related to the Chinatown, Victorian Row/Old Oakland, and the Convention Center projects will incrementally add to the impacts created by the City Center project.

Based on the City Center EIR prepared for the Oakland Redevelopment Agency,² the following significant impacts are anticipated when the project is complete:

- The increased traffic (20,000 automobiles daily) related to the project would increase traffic congestion³ in the area but would

¹ Section 110(D) of the Housing Act of 1949 permitted local communities to utilize the costs of public facilities as non-cash credit towards obtaining federal grants for redevelopment projects.

² Environmental Impact Planning Corporation, Oakland City Center Environmental Impact Report (prepared for the Oakland Redevelopment Agency, March, 1973).

³ A three-lane elevated ring road linking the project's garages to the proposed Grove-Shafter Freeway extension would feed 58 percent of the automobile traffic directly into the garages.

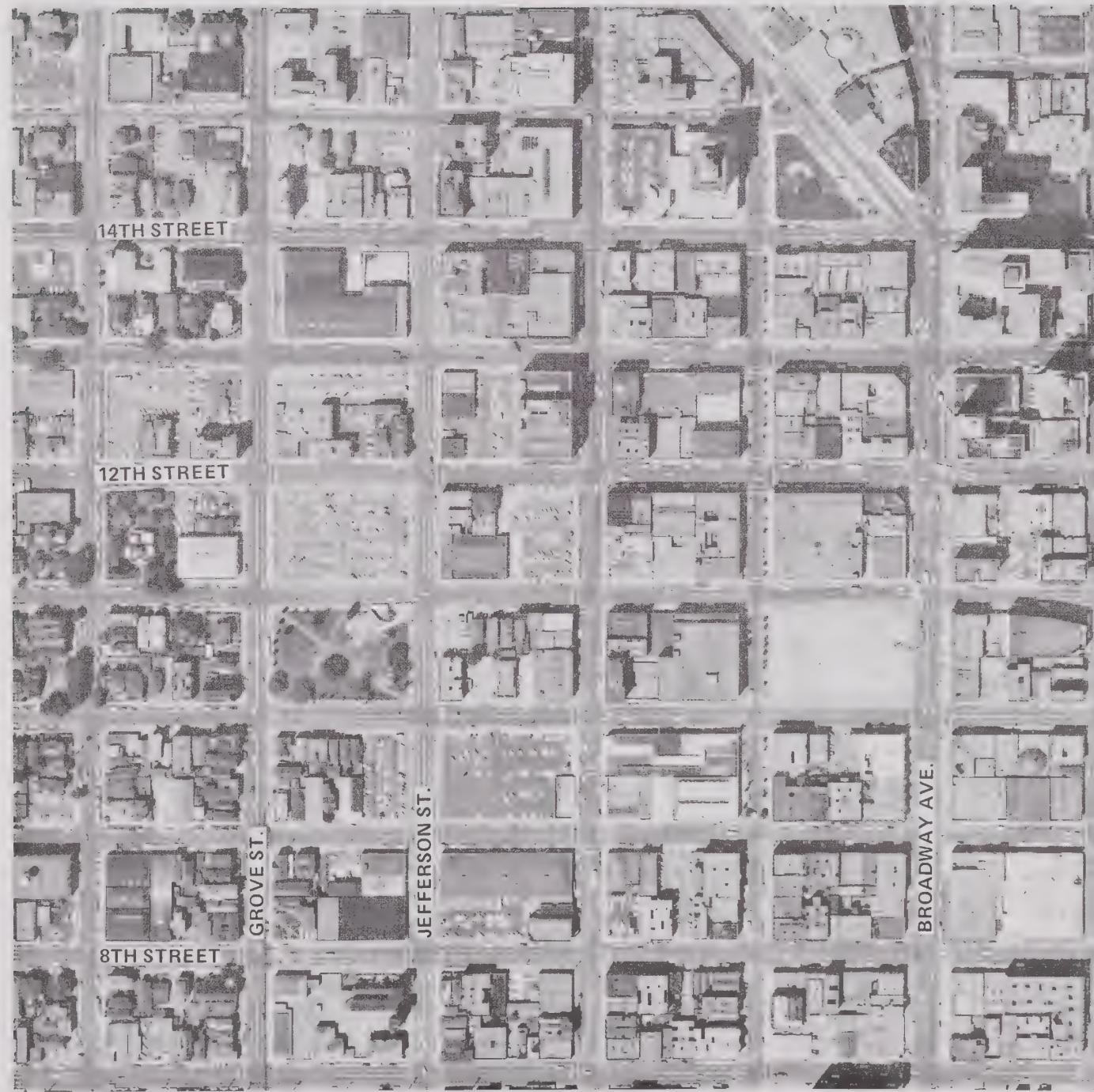


Plate 12
12TH STREET STATION, OAKLAND: 1965



Plate 13
12TH STREET STATION, OAKLAND: 1975

not significantly affect the citywide air quality level in Oakland. However, adverse localized air quality impacts could occur along 14th Street and the Center's plaza during periods of minimal wind (usually during winter months).

- A 5dB(A) noise increase, which would be perceived as a 50 percent increase, would occur during evening hours. No significant increase over current daytime noise levels is anticipated.
- The development of the City Center project does not involve the allocation of virgin land resources, as the entire site has been occupied by structures, roads, and other facilities since the turn of the century. Thus, no impacts to the natural environment are anticipated.
- The total projected energy consumption of 314,200 kilowatt-hours per day is roughly 2-1/2 times the amount previously required by the site. This would have a minimal impact on both local and regional facilities and supplies.
- In terms of social impact, the major significant impact related to the project was the displacement of 568 dwelling units. These units were generally of poor quality and were 18 percent vacant, but did represent a reduction of available, low-income housing resources. Although crime within the project area has declined as a result of the relocation of residents and businesses, most of it has merely been displaced from this area to others within Oakland.
- As stated in the EIR, potential sources of visual impact resulting from this Project are primarily the parking structures and their fortress-like design.

Of the 34,000 total daily persons expected at the site after completion, 27,000 are expected to arrive in 20,000 automobiles, 3,500 by BART, and the remaining 3,500 by other means. Thus, BART will serve slightly more than 10 percent of the total number of people ultimately expected each day at City Center. This figure gives a rough indication of the relative importance of BART to the project.

Since most of the identified impacts are related to increased automobile traffic near the site, the extent to which BART is successful in serving persons coming to City Center would tend to reduce such impacts. BART was, however, instrumental in providing a portion of the local financial credits necessary to finance the project. Thus, the displacement of 568 dwelling units and the associated social impacts must be at least partially attributed to BART.

Lake Merritt Station

The area surrounding the Lake Merritt station includes many institutional uses, mixed with older, multi-family residential uses primarily housing a lower-income population. Observed changes in the immediate area since 1965 include the following (also see Plates 14 and 15):

- Oakland Art Museum.
- Laney College.
- BART headquarters.
- Relocated park.
- Street improvement (widening of East 7th Street).

The area is zoned for high-density residential and office uses. The Lake Merritt-Coliseum Development Commission (sponsored by the City of Oakland) studied the area within a half-mile radius of the BART station to make planning recommendations; however, their report was never presented. Current considerations include the development of a regional government center around the existing county and state office buildings, and 1500 to 2000 infill housing units. No definitive plans have been formulated at this time.

A direct development link exists between Laney College and BART. The Peralta College District, of which Laney College is a part, had five sites under consideration for a new campus. The City of Oakland, anxious to have a downtown campus, proposed a plan whereby they would acquire the land for the campus and lease it to the District for a nominal amount. The District agreed, and the City acquired the land using the cost of the Lake Merritt station for a portion of its non-cash grant-in-aid credit against federal matching funds.

The impacts associated with the development near the Lake Merritt station are not discussed here because of their low level and because of a lack of appropriate secondary data sources.



Plate 14
LAKE MERRITT STATION: 1965



Plate 15
LAKE MERRITT STATION: 1975

RICHMOND

The Richmond BART station is located adjacent to a 107-acre urban renewal project which encompasses downtown Richmond. At completion, the project will provide approximately 845 new dwelling units and 3,600 additional jobs. Currently, 173 housing units have been completed, and approximately 2,400 new employees are working within the downtown project area. Observed changes in the BART station area since 1965 include the following (see also Plates 16 and 17):

- Social Security Payment Center (six-story building with 2,000 employees).
- Pacific Gas & Electric Company building.
- A two-story Redevelopment Agency building.
- A three-story office building with 45,000 square feet.
- New retail space of 60,000 square feet.
- 173-unit townhouse and apartment development.
- Pedestrian mall along Nevin, from 13th Street to BART.
- Street improvements.

Additional development planned within the downtown project includes Kaiser medical facilities (hospital and clinic), additional housing (175 to 200 units), commercial development, completion of an AMTRAK station adjacent to BART, and the development of a transportation center (to include Greyhound and Continental Trailways buses as well as BART and AMTRAK).

Total daily exits at the Richmond BART station were 1,400 in June 1977. This is the lowest total for any of the 12 station-area case study sites and the lowest total for the four line terminal stations (Richmond, Concord, Fremont and Daly City).

Population for the city of Richmond has declined by approximately 5,000 since 1970. Traffic volumes on Barrett Avenue have increased substantially since 1968, while volumes on MacDonald have decreased slightly over the same period. It is estimated that an additional 700 automobiles daily are entering and leaving the area as a result of the new Social Security Center. Parking problems are being encountered, since Center employees are driving rather than using BART to the extent anticipated.

Impacts

The new Social Security Payment Center is the dominant element in the redevelopment project. In the EIS covering this development, the following impacts or project considerations were identified:¹

- The site selection process utilized "BART station proximity" as a primary criterion.
- Richmond has the highest unemployment in the Bay Area and has been identified as an impact area by the Economic Development Administration (EDA). Significant positive impacts on the social environment are anticipated as a result of the new employment opportunities.
- No significant adverse effects on the atmospheric, acoustic, or natural environments are anticipated.
- The siting of the Center within the Richmond downtown urban renewal area will serve as a catalyst to the realization of the long-term Richmond development plans which include extensive economic and population growth for downtown Richmond.

An additional factor, not specifically addressed in the EIS, is the fact that the Center was formerly housed in four leased locations and one federal-government-owned location in downtown San Francisco. Thus, approximately 2,000 jobs were transferred from downtown San Francisco to downtown Richmond.

With respect to the impact of the overall plan for the downtown, the conclusions are essentially the same as those for the Social Security Payment Center. That is, no significant adverse effects on the atmospheric, acoustic, or natural environments are anticipated. Rather, a significant, positive effect on the social, manmade, and economic environments is anticipated and is the objective of the plan. Current air, noise, and water pollution levels are low in the downtown area.²

¹ U. S. Department of Health, Education and Welfare, Final Environmental Impact Statement, Social Security Administration Payment Center, San Francisco, California, June 1973.

² Richmond Redevelopment Agency, Environmental Information Statement (prepared for the Department of Housing and Urban Development, April 1974).



Plate 16
RICHMOND STATION: 1965



Plate 17
RICHMOND STATION: 1975

In this case, a fairly strong link can be made between the presence of BART, the adjacent development, and the indirect environmental impacts. BART was important in the financial feasibility of the overall project (credits equal to roughly 10 percent of local costs) and was a critical factor in bringing the Social Security Payment Center to Richmond -- a major catalytic action for the downtown redevelopment effort.

BERKELEY

The Berkeley station is sited in the center of the Berkeley CBD and is two blocks west of the University of California campus. The area near the station is primarily devoted to commercial, office, government center, and entertainment uses. A significant portion of the residents in the area are either students or retired persons.

Given the unique characteristics of this station location, total daily exits from the station are relatively high (5,050 in June 1977). Even with this high patronage, actual development near the station has been limited to the following: (1) a high-rise (14-story) office building with adjacent 400-car garage, (2) new low-rise bank building, (3) many new businesses in old buildings, and (4) improvements to Shattuck Avenue. Plates 18 and 19 depict the level of changes between 1965 and 1975. While vehicular volumes in the vicinity of the station have increased somewhat over 1964 levels, the increase since 1969 has been very small. This activity level may be related to the fact that citywide population decreased from 117,000 to 109,000 between 1970 and 1975.

Recent development regulations pertaining to the downtown area have included restrictions on the amount of parking that can be provided, a height limit of 100 feet, and a building floor area ratio (FAR) of four. These policy changes could put a damper on significant future development. Alternatively, future development may occur within these regulations, resulting in potentially significant BART patronage activity at the station. If this occurs, further development or reuse could occur in response to the greater pedestrian activity.

The level of environmental impacts resulting from these changes is low, with no significant increases anticipated. No discussion of impacts is attempted here due to a lack of secondary data sources.



Plate 18
BERKELEY STATION: 1965



Plate 19
BERKELEY STATION: 1975

WALNUT CREEK

Despite its role as the Central Business District for nearly 80,000 people, Walnut Creek's Core Area is not intensively developed. Only one-third of the Core Area is devoted to some form of commercial or office uses; another one-third is vacant, used for marginal uses such as parking, or developed for single-family homes; and the remaining one-third is used for multi-family apartments, parks, and institutional uses.¹ The Walnut Creek BART station is within this Core Area, adjacent to a freeway.

Observed changes since 1965 in the immediate station area include the following (see also Plates 20 and 21):

- A 10-story office building.
- New commercial/manufacturing establishments (along North California, North Main and North Broadway).
- Street improvements (North Main, North California and Ygnacio).
- Some new multi-family housing along North Civic Drive.

Total daily exits at the Walnut Creek station were 3,825 as of June 1977. This total is fairly typical for an outlying suburban station.

Walnut Creek's population has grown rapidly over the past 16 years, reaching an estimated total of 47,000 in 1975; it is the 13th fastest growing city in the nation. As a result of the rapid growth in population, traffic volumes near the BART station have increased substantially; however, traffic congestion is generally minor to moderate at the present time.

A Core Area Plan was adopted in 1976 as an amendment to the city's General Plan. The Core Area Plan includes approximately 600 acres and would, if implemented, result in the following land use changes:

- 2,500,000 square feet of new office and retail development to be built.
- 1,035 new apartment units.
- 90 single-family homes to be replaced by apartment units.
- 85 acres of vacant land to be developed.
- High-rise buildings to be developed near BART.

¹City of Walnut Creek, Core Area Plan (November 1975).

Overall, the Core Area Plan recommends a substantial increase in commercial uses at the expense of residential uses. Within these two broad categories, several other major changes are proposed, i.e., (1) the plan increases the area for retail stores and offices while decreasing that for service-commercial uses; (2) the plan reduces the density of the areas designated for residential uses and retains several single-family neighborhoods; and (3) the plan defines the commercial land use categories much more closely than the existing General Plan.

Impacts

The impacts associated with the Core Area Plan can be summarized as follows (based on the EIR):¹

- Future development in the Core Area will generate over 55,000 daily trips by 1985 and will increase traffic on all streets leading to the Core Area. As a result, street improvements will be required throughout the Core Area. However, even with the planned street improvements, several intersections will be more congested than at present (1975).
- As a result of development-generated traffic, several violations of carbon monoxide standards can be expected within the Core Area due to severe traffic congestion at intersections and on the freeways. Core Area development, by itself, will probably not result in violations of other state or federal air quality standards.
- Currently, Interstate 680 causes the most severe noise impacts in the Core Area. More moderate impacts are caused by BART and several arterial streets. Implementation of the Core Area Plan would continue to place residential uses in areas affected by excessive noise levels. Furthermore, development-generated traffic will further raise noise levels on many of the streets of the Core Area. Planned mitigation measures include revisions to the Building Code with respect to residential noise insulation and noise attenuation measures for I-680 (by Caltrans).
- Existing vegetation within the Core Area consists primarily of street trees and other non-native plants, a few native trees, and some native riparian (stream) communities. The

¹ Community Development Department, Final Environmental Impact Report, Walnut Creek Core Area Plan (April 1975).



Plate 20
WALNUT CREEK STATION: 1965



Plate 21
WALNUT CREEK STATION: 1975

native riparian vegetation provides the only significant wildlife habitat in the area. The further development of the Core Area will not adversely affect existing wildlife habitats if the remaining creek areas are left in their natural state and major trees and tree areas are kept intact.

- Potential hazards in the Core Area include faulting, landslides, ground-shaking, liquefaction, high shrink-swell potential soils, and flooding. Mitigation measures required include geologic hazard reports (and necessary recommendations) for each development, soils and foundation reports (including appropriate measures to solve identified problems), and flood-proofing of all buildings below the level of the 100-year flood.
- Socioeconomic impacts attributable to the Core Area Plan include: (1) a loss of 90 single-family homes,¹ (2) a gain of 1,035 new apartment housing units, and (3) new employment totaling 7,500 office workers, 2,400 retail workers, and additional jobs related to hospitals and automobile sales.
- The Core Area Plan recommends retaining the three view corridors judged most significant by the staff: (1) the entry views from BART, (2) Newell Avenue, and (3) Mount Diablo Boulevard. However, many of the other views identified in the Plan document are not protected and will likely be lost as the downtown develops more intensively. The Plan contains many urban design principles to preserve views and improve the visual character of the Walnut Creek Core Area.²

The Core Area Plan makes only limited proposals for mass transit in the Core Area, recommending an expansion of the shuttle bus system, increased services to users, and enhancement of the BART stations' attractiveness to mass transit users (e.g., adding a second story of parking). Due to the limited nature of the Plan's proposals, the EIR document states that any reduction in downtown automobile traffic would be slight. Thus, reductions of vehicular-traffic-related impacts would be correspondingly small.

¹ These homes are characterized as being excessively impacted by noise, close to BART, and largely in absentee ownership.

² Core Area Plan, Urban Design Element, pp. 36-63.

UNION CITY

Of the 12 case study sites, Union City is the fastest-growing area in terms of relative change between 1970 and 1975. Population of the City increased from 14,724 in 1970 to 30,741 in 1975.¹ This represents an increase of 108 percent.

However, even with this very rapid growth rate, the area surrounding the BART station is still largely undeveloped. Since 1965, the following changes have occurred in the immediate vicinity of the station (also see Plates 22 and 23):

- A new shopping center of approximately 150,000 square feet.
- A new park and community center.
- Some new single-family housing.
- Street improvements (Decoto, Alvarado-Niles).

In terms of policy change, the area surrounding the BART station has been designated as the CBD and is slated for commercial uses and higher-density residential. The industrial uses near the station are planned to remain.

Total daily exits in June 1977 were 2,575 at the Union City BART station, a relatively low figure for an outlying suburban station. This patronage figure may be partially explained by the Special Census data, which indicated that only 25 percent of the City's population work in Oakland, Richmond, or San Francisco -- the work trips most likely to be served by BART.

Other indicators of development-related activity include traffic volume counts. While the population of Union City has increased by more than 100 percent since 1970, traffic counts on Decoto Road and Alvarado-Niles Road have increased much less -- on the order of 25 percent. This can be attributed to the fact that the area around the station is still substantially undeveloped.

Because of the current low level of environmental impacts and because of a lack of secondary data sources, no discussion of impacts has been attempted.

¹ Source: 1975 Special Census, Population Research Unit, State of California Department of Finance.



Plate 22
UNION CITY STATION: 1965



Plate 23
UNION CITY STATION: 1975

FREMONT

The area surrounding the Fremont BART station is still largely undeveloped (with agricultural zoning), as shown on the 1975 aerial photograph (Plate 25). Since 1965, the following changes have occurred in the immediate vicinity of the station (cf. Plate 24):

- Expansion of Washington Hospital.
- Completion of Fremont Fashion Center (regional shopping center).
- Development of Civic Center Complex.
- New single-family housing in surrounding area.
- Street improvements (Mowry) and new streets (Walnut, Civic Center and Paseo Padre).

Total daily exits were 3,850 for the Fremont BART station in June 1977. This is fairly typical of the other suburban, terminal stations. For example, the Concord station total was 4,675 in June 1977.

The city of Fremont has experienced very rapid growth over the past one and a half decades, growing from 44,000 in 1960 to 101,000 in 1970, and to an estimated 116,000 in 1975. These figures reflect the general growth pattern of the entire southern Alameda County area.

The following tabulation indicates the related traffic volume increases which have occurred between 1962 and 1975 for streets near the BART station site and surrounding area:

	24-Hour Traffic Volumes			
	1962	1965	1970	1975
Mowry Avenue	6,000	13,000	22,000	22,500
Civic Center Drive	--	--	7,900	9,000
Paseo Padre Parkway	--	--	6,500	20,700
Fremont Boulevard	13,600	21,900	29,600	26,800
Walnut Avenue	--	--	3,600	6,600

Source: City of Fremont Public Works Department.

The major policy change affecting Fremont is the Central Area Plan which was adopted in 1969. Major features of this Plan include expansion of the CBD to the south of the BART station and intense residential uses (50 to 70 dwelling units per acre) immediately to the north and east of the open space (pond and fault area) which adjoins the station. This development could increase BART's patronage. The high-density residential uses would be particularly significant, since up to 3,000 dwelling units, housing roughly 6,000 to 9,000 persons, would be located within walking distance of the station.

Impacts

The BART Area Plan covers a 600-acre area east of the Fremont BART station and is part of the Central Area Plan. Environmental impacts associated with the BART Area Plan are the following:¹

- Population would increase from 15,600 to 20,000 in the BART area, and up to 7,200 dwelling units would be allowed.
- High-density development on Mowry Avenue will accelerate projected traffic congestion on Mowry Avenue, east of Civic Center Drive, and on Peralta Boulevard.
- The impact on air quality is expected to be slight, since increased pedestrian trips are expected to offset the increase in density in terms of automobile usage. Site planning and building placement can affect microclimate conditions by increasing or decreasing wind velocities. This effect should be taken into account in the design of medium- and high-density developments proposed in the area.
- Significant noise levels and possible vibration will be generated by the proposed development only during construction. If Highway 238 is rebuilt into a freeway, noise could have an adverse impact on the area.
- Because the area has been farmed quite intensively for many years, it is believed that development will not disrupt any natural areas or significant wildlife habitats. Retention of the Tule Pond will preserve the bird nesting and feeding area provided by the pond.

¹ City of Fremont, BART Area: Proposed General Plan Amendment and Final Environmental Impact Report (May 1974).



Plate 24
FREMONT STATION: 1965



Plate 25
FREMONT STATION: 1975

- Hazards in the area include the Hayward fault and the high water table and alluvial deposits east of the fault, which could cause differential settlement. Special geological studies and design considerations will be required in the BART area, particularly for high-rise structures.
- It is anticipated that the development in the area will continue to serve a population in a fairly broad income range. Housing for the elderly is a desirable type of development in this area because of the good access to transportation, shopping, and medical facilities; also, the increased density recommended adjacent to the BART station may enhance the economic possibilities for developing such units.
- Potential visual impacts may occur related to the proposed high-density uses near the BART station; however, specific visual evaluation can only be made when actual development proposals are submitted.

A recent study estimated that only 6,000 trips per day are currently being made by BART or bus in the Fremont area which were formerly made by automobile.¹ This represents about 1-1/2 percent of all trips in the area. These figures indicate that BART currently has very little effect on vehicular traffic volumes and the associated environmental impacts. However, if new development in the area is designed with potential BART users in mind, BART may encourage a decrease in vehicular traffic.

An indicator of potential BART influence on traffic is the pre- and post-BART accessibility comparison of transit versus highway (automobile) travel to major destinations such as downtown Oakland and downtown San Francisco.² Before BART, a transit (bus) trip from Fremont to Oakland or San Francisco took approximately 45 minutes longer than a comparable automobile trip, doubling the travel time. Using BART, the transit trip now generally takes the same time as a comparable automobile trip, and a daily saving of approximately \$3 is realized by transit users compared to auto users for the same trip. The key finding is that transit is now competitive with the automobile for trips to major workplace destinations.

¹ TJKM and Comsis Corporation, Freeway Deletion Impact Study (prepared for the City of Fremont, August 1976).

² Peat, Marwick & Mitchell, "Exploratory Network Analyses of BART's Impacts Upon Accessibility." Document No. DOT-BIP-WP 15-3-75 (Berkeley: Metropolitan Transportation Commission, July 1975).

CHAPTER 5. DEVELOPMENT QUALITY

Publicly funded landscape and street surface improvements were made at several station sites in conjunction with BART construction. These improvements were undertaken to better accommodate the new pedestrian and vehicular patterns engendered by BART and to put new life into deteriorating areas. While BART was the primary impetus for the improvements, their fruition was made possible by strong leadership and financial commitments from the local jurisdictions and business community.

Four case studies of publicly funded improvements in areas adjacent to BART stations are presented below. The improvements considered are all in urban areas: along Market Street and Mission Street in San Francisco, along Shattuck Avenue in Berkeley, and along Nevin Avenue in Richmond. They vary widely in cost and scope.¹

The intent of the case studies is to identify successful elements and problems of the street improvements as input to decisions about design scope, concept, and coordination in planning for improvements in conjunction with a large-scale public project such as BART. They document the process of planning and construction as well as discussing the physical improvements.

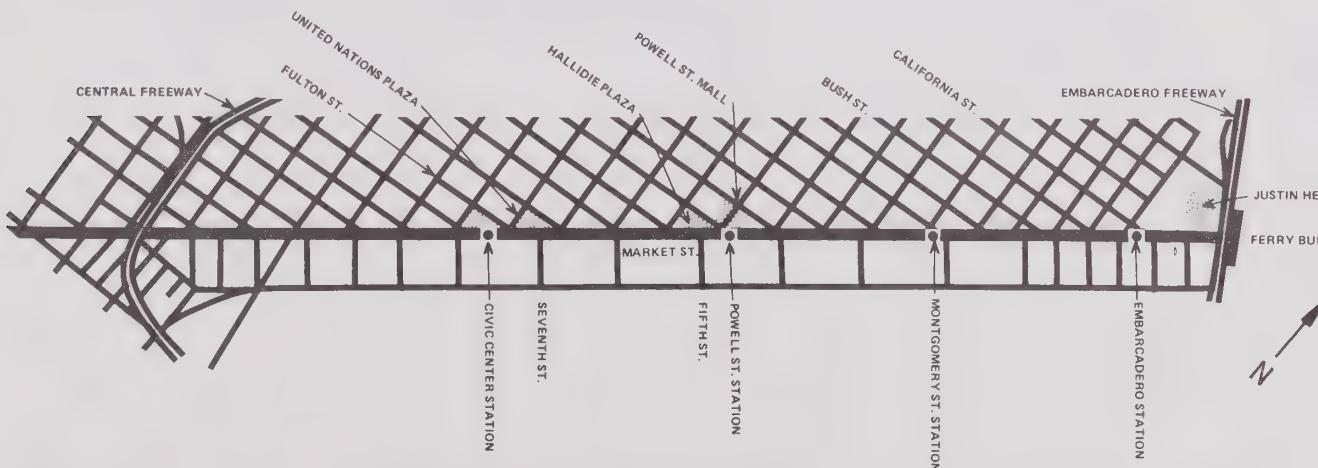
¹ A major street improvement project not studied in detail here took place over fifteen blocks (about one mile) along Broadway in downtown Oakland (including the 12th and 19th Street BART stations). Major changes included sidewalk resurfacing (exposed aggregate and tile), the addition of concrete street furniture, the reconstruction of intersections in decorative concrete (chocolate-colored stripes), new lighting and tree planting (sycamores). This project differs from those studied mainly in that it was funded by the city through assessment district proceedings; owners of buildings with frontage along Broadway paid for the improvements. In addition, BART compensatory funds for resurfacing 600-800 feet over each station were applied.

MARKET STREET, SAN FRANCISCO¹

Market Street is the main thoroughfare in downtown San Francisco. Local streetcars run along Market Street, and most downtown transit lines converge there. Because of its relative flatness in a city of hills, and because of its centrality, it has functioned historically as San Francisco's mainline to the downtown area and the waterfront. It is the line of march for all major parades and it is the city's place of public celebration. It has always been a strong functional feature of the city and a line of orientation for San Franciscans and visitors alike.

A massive beautification effort has recently refurbished 2.2 miles of Market Street between the Ferry Building and the Central Freeway Overpass (Figure 9). The project was financed primarily by a city bond issue for \$24.5 million and supervised by the Market Street Development Project (MSDP), a private agency.

Figure 9
MARKET STREET IMPROVEMENT AREA



Streetwork on the project began officially in January 1972. As of the middle of 1977, most major work has been completed. Work in progress includes the United Nations Plaza and fountain; work remaining includes street resurfacing after the removal of streetcar tracks and construction of two minor pedestrian areas. (BART subway construction included a separate level for the subway operation of Muni streetcars which currently run on tracks down the center of Market Street.)

¹ Much of the information in this section was gained through interviews with Bernard Averbuch, Executive Director of the Market Street Development Project (MSDP) and coordinator of the Market Street work since 1969; some of the descriptive material was adapted from memos, press releases, fact sheets, and meeting minutes supplied by the MSDP.

The project designers are the architectural firms of Mario J. Ciampi and Associates, John Carl Warnecke & Associates, and Lawrence Halprin & Associates. The redesigned street is geared to the pedestrian and includes sidewalk ramps for handicapped persons. Wide brick sidewalks, double rows of sycamores, and the "Path of Gold"¹ streetlight system bring a unified look to the street, as do the furnishings. The street furniture is characterized by large, bronze-defined shapes, with secondary use of glass and granite; furniture includes bus shelters, paired telephone booths, flower stalls, newsstands, clocks, drinking fountains, benches, poster kiosks, and waste receptacles (Plate 26). In an early press release, William R. Hull, the overall project architect, described the design as "modular in concept, rectangular, lean, straightforward" and the effects sought as "elegance, solidarity, sophistication and naturalness."²

Plazas are the variety in an otherwise unified design. They integrate BART and Muni with the street activity and provide seating areas away from the flow of traffic. The main publicly funded plazas are those at the Embarcadero and at the Powell Street and Civic Center BART stations. Crocker Bank built a plaza at the Montgomery Street BART station.² There are smaller public plazas (at Bush/Battery and California/Drumm) and a number of privately owned, non-project plazas in connection with buildings along Market Street (e.g., Fox Plaza, Aetna Life, Standard Oil, Crown Zellerbach, and Mutual Benefit Life).

The Justin Herman Plaza (Plate 27) at the Embarcadero was funded separately by the Golden Gateway Redevelopment Project, under the leadership of the late Justin Herman, then director of the city's redevelopment agency. Although there is no direct opening to the BART station, it functions as an appropriate beginning/end of the new Market Street and provides a link from the street to the Embarcadero Center³ and to the waterfront. According to Lawrence Halprin, primary designer, the plaza was conceived as "a total environment in which all the elements working together create a

¹ The "Path of Gold" lamps are replicas of the decorative, 32-foot, three-globe carbon arc lights which were installed on Market Street in 1916, marking an epoch in the history of street illumination. The new standards contain high-pressure, high-intensity, sodium vapor lights.

² For a description of the Montgomery Street Plaza and additional discussion of other BART-adjacent plazas, see DeLeuw, Cather & Company, The BART Passenger Environment. Document No. DOT-BIP-TM 23-4-77 (Berkeley: Metropolitan Transportation Commission, July 1977).

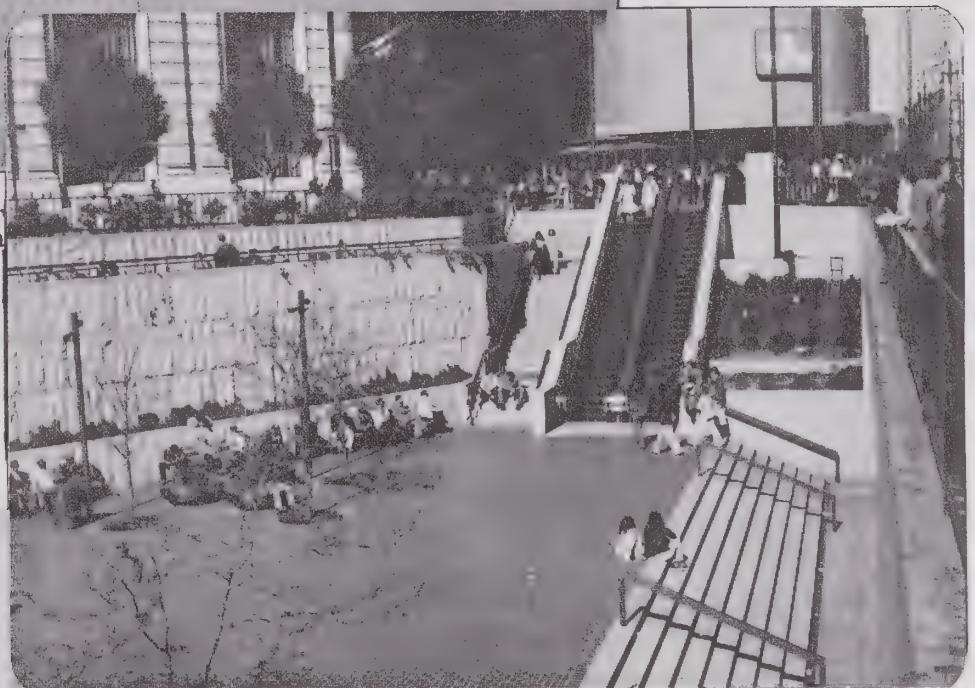
³ A five-block complex being developed which will include four office buildings with approximately 3,000,000 gross square feet, and an 840-room hotel. The office buildings, three of which are completed, will include a three-level, 270,000-square-foot shopping gallery.



Plate 2c
MARKET STREET IMPROVEMENTS



United Nations Plaza



Hallidie Plaza



Justin Herman Plaza

Plate 27
MARKET STREET PLAZAS

place for participation."¹ The open, brick-paved plaza features a large and controversial fountain and free-form sculpture designed by Armand Vaillancourt, a Canadian sculptor. Halprin says of the sculpture: "It is an environmental event in which water, light and people are as much a part of the sculpture as are the solid forms."² The Embarcadero Free-way, which stands between the plaza and the waterfront, is at all times noticeable; by using concrete in bold angular forms, Vaillancourt managed to respect the freeway's presence while dominating it. Artists and craft-workers are licensed by the city to sell their works along one edge of the plaza; on weekends, many artists set up stands, and the plaza takes on a festive atmosphere. The plaza is flanked by a grassy area on one side and a linear park/walkway with benches on the other, extending the open area for about four blocks.

The Andrew F. Hallidie Plaza (Plate 27), at BART's Powell Street station, occupies the north side of Market Street on both sides of Fifth Street, which was extended across Market from the south to facilitate north-south traffic. The plaza extends east to Powell Street, which has been closed off from Market to become a block-long, tree-lined pedestrian mall around the Powell Street cable car turntable. Most of Hallidie Plaza is below street level, with access by escalator or broad steps. At street level, it is open and bordered with trees, benches, flagpoles, kiosks, vending booths, and planters which display seasonal flowers. A tourist information center is in the plaza below the street; \$100,000 was donated for the establishment of the center, for which the city supplies staff and maintenance.

The United Nations Plaza (Plate 27), at BART's Civic Center station, is located at Fulton/Market, extending east to Seventh Street (which, like Fifth Street, has been extended north of Market). The plaza includes a large tree-lined mall leading directly to the City Hall and the Civic Center complex. The fountain and sculpture, which will be the dominant feature of the plaza, is scheduled for completion in mid-1977. The controversial fountain, designed by Lawrence Halprin, is planned as a participatory environment of granite slabs, water courses, pools and jets which will provide a dramatic range of experiences.

¹ Lawrence Halprin, Cities (Cambridge, Mass.: MIT Press, 1972), p. 228.

² Halprin, p. 228.

History¹

During recent pre-BART history (about 1940-1965), Market Street developed urban blight and a bad reputation. The buildings along the street became run-down, and "the blight" crept in from the area south of Market Street, bringing peepshows, pinball establishments, and porno movie houses. Parts of Market Street were territory for winos, drug dealers, and hustlers; other parts were simply lifeless, ugly and neglected.

Early in the 1960s, while BART was being planned for submission to the voters, an influential citizens' organization named SPUR (San Francisco Planning and Urban Renewal Association) began to consider the issue of Market Street. It sponsored a plan for the "sprucing up" of Market Street, whereby contributions of \$30,000 to \$40,000 per year for two to three years would be spent for architects' study and advice and for coordination of private efforts to accomplish a street cleanup. This plan was approved in June 1962 by property owners, businessmen and merchants of Market Street. The Market Street Development Project (MSDP) was subsequently formed as an affiliate of SPUR to coordinate the studies and clean-up efforts.

The MSDP hired a group of architectural firms to study the area and make recommendations. The resulting report,² issued to SPUR in October 1962, suggested that Market Street could become one of the great boulevards of the world and planted the seeds for a multimillion dollar renewal project. In the years that followed, studies were made of downtown traffic and parking, zoning, delivery, Muni routes, utilities, and the opinions of Market Street's business community. Basic general plans for widening and furnishing sidewalks and building BART-adjacent plazas were announced in San Francisco papers late in 1967 and taken to the voters in June 1968.

San Francisco is an image-conscious city. Its people are aware of the city as a tourist attraction and recognize the perpetuation of its beauty as a necessity. Moreover, the imminent arrival of BART made the timing right for extensive renewal plans. There was general optimism about the new, space-age rapid transit system and its probable economic effects. There was common recognition of the bad condition of Market Street. It was sensible to plan needed improvements in conjunction with the BART

¹ Major source: Market Street Development notebooks, available from the City Librarian, San Francisco Public Library.

² "What to do about MARKET STREET," A prospectus for a Development Program. Prepared for MSDP, an affiliate of SPUR, by Livingston and Blayney (San Francisco, October 1962).

construction (major BART street work began in mid-1967), and thus save time and money and minimize inconvenience. Citizens responded by passing the \$24.5 million bond issue. This money was supplemented by about \$10 million from the U.S. Department of Housing and Urban Development.

As reported by the San Francisco Examiner-Chronicle on 26 May 1968, the \$24.5 million approved by voters included an "inflation allowance" and was budgeted as follows:

New roadway and sidewalk	\$ 7,600,000
Lighting	650,000
Street furniture	650,000
Landscaping	2,430,000
Muni railway refurbishing	1,200,000
Sewers	1,250,000
Fire protection (hydrants, mains)	1,340,000
Civic Center Plaza	5,500,000
Powell Street Plaza	1,500,000
Powell, Leavenworth, Fulton malls	1,000,000 ²
Mission Line Stations, Upper Market Station, West Portal Station to consist with Market Street Stations	1,000,000

The Market Street beautification work was achieved after BART's major streetwork was completed, not simultaneously with it as originally hoped. As a result, disruption somewhere along Market Street was almost continuous for ten years, except for month-long holiday work shutdowns in 1971 and 1972. Pacific Gas and Electric began tearing up Market Street

¹ Published jointly on Sundays by the Examiner and the Chronicle.

² \$500,000 of this money was earmarked for renovating the areas surrounding the Church and Castro Street Muni stations. Plans for beautifying Market Street between the Central Skyway and the foot of Twin Peaks included a plaza at Castro Street, a block-long linear park, broad sidewalks lined with sycamores, special intersection treatment. As of mid 1977, construction has not yet started.

in September 1965;¹ BART began its major streetwork in mid-1967; street beautification began in January 1972; and episodes of Market Street's "trench warfare" were reported by local press well into 1976. Newspaper articles during the construction period reported the impatience of the citizens with the noise, dirt and confusion. Streetcar and bus routes were shifted periodically; sidewalks were moved or eliminated. Pedestrians met with an obstacle course of barricades and ditches, while drivers learned to take detours.

The section of Market Street between Montgomery Street and the Civic Center experienced the longest period of construction and the most disruption. Three BART stations lie within this area, two of which (the Powell and Montgomery Street stations) underwent two periods of construction because of delays in funding. The Civic Center and Powell Street stations have the project's most extensive adjacent plazas/malls. The extensions of 5th and 7th Streets across Market added to the burden of construction activity.

The San Francisco Chronicle reported on 22 September 1969 that business was down as much as 40 percent in the small businesses of Market Street due to BART construction.² There was leafleting and public protest by owners of small businesses claiming that the MSDP represented only the interests of big business and suggesting that streetwork had been unnecessarily prolonged.

Coordination of the work tasks with the BART District, city agencies, federal funding sources, and Market Street building owners and businessmen was a time-consuming process which was sometimes stopped entirely by lawsuits, individual relocation problems and long public controversies. Some of the factors contributing to project delays and confusion are listed as follows:

¹ San Francisco Chronicle, 26 April 1972.

² Records were not kept of the number of small businesses closing or moving away from Market Street during the construction; estimates range from "very few" to "many." Businesses surviving the construction period were subject to higher rents and assessments, although this may have been offset by increased customer traffic volume along the street.

- 126 businesses had subsidewalk space which they were required to vacate (by building a retaining wall) or prepare for tree planting and sidewalk improvements; some basements needed structural reinforcement. The space was prepared only after 18 months of negotiations.
- Twelve freight elevators were removed from the sidewalks of Market Street. Before they could be removed, alternative delivery systems had to be arranged and the merchants' permission secured.
- Negotiations for relocation of building tenants from the property claimed for the plazas and street extensions were long and arduous. The demolition of a low-income hotel tenanted mainly by elderly citizens resulted in a lawsuit against the city (eventually dropped).
- Quitclaim deeds had to be signed by merchants along the Powell Street mall, giving up their rights to access by auto traffic.
- Federal funds for extension of the Powell and Montgomery BART station mezzanines (requested by the city in February 1966) were delayed; thus, each station was completed and then underwent a second period of construction (1971-73), with accompanying disruption of Market Street.
- Construction of the Embarcadero BART station took longer than seven years as a result of funding complications and lawsuits. A station plausibility study was made in 1964-65; enabling legislation was passed by the state; Golden Gateway Redevelopment Project money (about \$13 million) was supplied to make the shell for the station only after a lawsuit challenging that use of the tax money; the station area was excavated in 1969-70; transfer of the West Portal Muni station money (\$24 million), which eventually funded the finished station, was challenged in a lawsuit which went through many appeals; the station was finally completed in early 1976.

- Public controversy about the United Nations Plaza and fountain¹ and changes of mind by the San Francisco Art Commission over a period of four years caused considerable delay in HUD funding for the fountain.
- The original assumption that Muni trolley bus lines would be removed from Market Street proved to be infeasible; temporary poles were installed to hold the lines. They will be replaced by permanent poles or eyebolts installed on buildings along the street.
- The first Muni cars were to have been placed in subway in 1974. As of mid 1977, delivery of the new subway cars is being delayed by manufacturer's problems.
- Utility maps for the street (dating to 1900) were found to be inaccurate; some maps were never found. As a result, there was unscheduled "exploratory" streetwork and utility remapping.

Project-Related Regulations and Controls

A month after the first clean-up plan was initiated by SPUR (June 1962), a police ban on permits for pinball and peepshow operations was announced.² This was the first of many attempts by the city and the Market Street Development Project to redetermine the nature of Market Street by regulation and/or pressure.

Two ordinances enacted by the city are directly related to the physical improvement of Market Street.

¹ Opponents of the U.N. Plaza fountain design favored something more traditional (e.g., a copy of the Trevi Fountain in Rome) or something less expensive (e.g., a reflecting pool around the Bufano "Peace" sculpture, which was being removed from the airport at the time). This was one of three long and vociferous public controversies stirred by elements of the street's design. The massive planting of London plane trees (sycamores) was opposed on grounds that the trees were inappropriate to the city's climate and difficult to maintain. The bronze-clad litter receptacles were opposed for their cost (\$950 each) and because their capacity was judged to be insufficient.

² Reported in local newspapers 6 July 1962.

- A parking ordinance reduces the number of off-street parking spaces required, based on proximity to BART.
- The Market Street Sign Ordinance was enacted by the city in December 1969 to regulate the sizes and types of signs displayed by businesses on the new Market Street. The ordinance is detailed and specific, putting a 6-foot limit on sign overhang, limiting awning overhang, requiring sign consistency among businesses within the same building, and prohibiting roof signs. The enforcement of this ordinance has allowed the sidewalk improvements to become the dominant visual features of the street.

Regulations and controls were applied to business activities as well as to street activities. By revoking or denying permits for operation, the city stopped businesses such as a topless dancing nightclub, nude "encounter" parlors, a masseuse, and a nude photo studio from operating on Market Street. Health and building codes were enforced to close a hotel for indigents. A theater registration ordinance was enacted as a means of controlling stag film theaters.

Arrests were made of street musicians and street artists who violated the city's noise ordinance or obstructed Market Street sidewalks. Subsequent rulings by Municipal and Superior Court judges declared the arrests unconstitutional. Eventually the city began licensing street artists to market their works at the Embarcadero Plaza and at selected locations along Market Street.

Negotiations also took place on an unofficial level to discourage some activities. Representatives of the MSDP met with members of the Hare Krishna religious sect to encourage them to leave Market Street, with eventual success. A meeting of police officials, Market Street businessmen and representatives of the gay community was held to discuss the problem of male prostitutes at one intersection of the street.

Ongoing Problems

Control of pickpockets, purse thieves, over-aggressive street peddlers, itinerant beggars and "street characters" is a longstanding and ongoing concern of the Market Street business community, especially in the area around Hallidie Plaza. Increased efforts by police have apparently had little effect, and a five-year experiment using uniformed, unarmed civilians failed to alleviate the situation. A one-man police substation in Hallidie Plaza, built in conjunction with the tourist information center, has never been manned.

Responsibility for cleaning the plazas was not considered to be an issue until Hallidie Plaza opened in 1973, at which time the Public Works and Recreation and Parks Departments both disclaimed responsibility for cleaning. Eventually Public Works assumed responsibility, receiving a special appropriation of \$46,000 a year to maintain the area. The maintenance has not been entirely satisfactory; as a result, the BART District has been asked to take the contract for plaza maintenance.

Cleaning the sidewalks is the responsibility of property owners and tenants along the street. It has become a problem on Market Street because of the much wider sidewalks, the brick surface, and the tree wells. Materials adhering to the brick surface are more noticeable than they would be on concrete and often more difficult to remove. The fine grates covering the tree wells catch litter and garbage. Wire mesh and crushed rock were placed inside the wells to keep litter and garbage from accumulating, but material still lodges in the grates themselves. Merchants are inconsistent in sidewalk cleaning efforts in spite of pressure by SPUR and MSDP to keep it clean. SPUR suggested the creation of a special assessment district for sidewalk maintenance within the Market Street project corridor in January 1974, but that proposal was shelved when it met with strong opposition during a special hearing.

Follow-Up

The Market Street Development Project will continue to operate under a series of five-year programs. By working with Muni and BART, the San Francisco Redevelopment Agency (on issues concerning the proposed Yerba Buena Center), the Police Department and other city agencies, the MSDP hopes to promote the maintenance and further improvement of the street. The MSDP has encouraged and sponsored painting and sculpture exhibitions in the large commercial buildings along the street. Through the MSDP's "People in Plazas" program, musicians and other street entertainers have been scheduled to give mid-day concerts in Hallidie Plaza. These concerts have been well received, and the program is expected to continue and expand. Sponsorship of such programs will help to bring the positive energy of the city to Market Street.

Market Street Conclusions

There is an element of new vigor along Market Street after the long period of construction. Pedestrian traffic has grown, and business has improved. The project is largely successful in physical terms. It consciously and effectively integrates BART stations with the street activity and offers reception/orientation areas for public transit patrons. Because of new

downtown development and a concentration of office workers, there is demand for and full use of the widened sidewalks, the plazas and the malls. The use of bronze and brick has brought a new warmth to the street; it is a pleasant physical environment. The most obvious problem with the design is that of cleaning; litter receptacles are inadequate in high-traffic areas, the tree grates catch and lodge litter, and the brickwork is difficult to clean.

Signs of urban blight are still evident along the street, and efforts to eliminate them can be expected to continue. The issue of controlling activity along the street has perhaps been partially resolved by licensing and scheduling street artists, musicians and entertainers. It is, however, a sensitive issue, and the question remains as to how much control any agency should have over the activities of private citizens on a public street.

Adverse effects to small businesses during construction are an unfortunate side-effect of a public street project of this type and magnitude. This is something which would best be considered and discussed with the business community in the pre-planning stages of a project. A sustained communication effort is essential to realistic community expectations about construction scope and duration. Protection and/or assistance for small businesses subjected to unusually long periods of publicly-sponsored disruption should be considered.

The beautification was timely in relation to the city's downtown development; the impetus for change was present, but the increase in downtown activity had not yet occurred. The increase in traffic combined with the rise in inflation rates over the past 10 years would have made later initiation of the project increasingly difficult. The long construction period was a result of factors that would probably not be different at another time; the remarkable thing about the project is that it was accomplished at all.

MISSION STREET, SAN FRANCISCO

The Mission District, located in the center of San Francisco, is a community of approximately 50,000 people.¹ It is the city's oldest residential area, probably chosen by early settlers for its sunny, mild climate within an area that is more often cold and windy. Nearly half the district's total population is Latin American, and a strong cultural identity is evident in wall murals throughout the area and in the small Latin-character shops and restaurants. There is some industry and heavy commercial land use in the northeast portion of the district. Stores and services are located along the major transportation routes: Mission, Valencia, 16th, 24th and Army Streets.

¹ San Francisco Department of City Planning, The Mission: Policies for Neighborhood Improvement (January 1976).

BART stations are located on Mission Street at 16th and 24th Streets. The two stations are identical except for a difference of wall tile color, and their similarity is reinforced by identical street-level plaza areas.¹ The plazas are owned by BART.

Station Plazas

Each station has two small brick-surfaced plazas on corner lots diagonally across the street intersection (Plate 28). In the center of each plaza is a large station opening with station access by escalators/stairs which emerge near the protected inside corner of the plaza away from the street. Plaza seating consists of wide concrete caps on the brick planters which line the inside borders of each plaza, with additional seating of the same sort around tall shrubberies in the north-side plazas. A metal fence of vertical bars stands between the planters and plaza-adjacent buildings. The wall around the station opening is about 3 feet high and made of brick capped with concrete. A brick-enclosed elevator shaft, added late in the design process, emerges near the sidewalk on the north-side plaza. A few sycamores are planted in each plaza area. Bricked pedestrian walkways at the intersection help to join the plaza components visually.²

Sidewalk Improvements

Sidewalk improvements extending along Mission Street³ for a block on each side of the BART plazas have little relationship to the BART plazas. Wooden benches and blue-painted metal, litter receptacles, newsracks, mid-block trellises and traffic light standards furnish the street. Tall palm trees were planted alternately with short evergreen Victorian box trees. A mosaic border inlay of red and blue tile decorates the sidewalk concrete (Plate 28).

¹ There is one striking difference between the plazas, a mural painting on the side of a building adjacent to the north-side plaza at the 24th Street Station. It brings life and character (as well as political protest directed at BART) to the plaza, and easily dominates the utilitarian plaza design.

² For additional discussion of the plazas, see other reports prepared for the Environment Project including: DeLeuw, Cather & Co., The BART Passenger Environment. Document No. DOT-BIP-TM 23-4-77 (Berkeley: Metropolitan Transportation Commission, July 1977); and Gruen Associates, Inc., Impacts of BART on Visual Quality: Interim Service Findings. Document No. DOT-BIP-TM 18-4-76 (Berkeley: Metropolitan Transportation Commission, March 1976).

³ \$500,000 of the \$24.5 million bond issue for Market Street beautification was budgeted for Mission Street improvements.



Plate 28
MISSION STREET IMPROVEMENTS

The total sidewalk improvement area is small (both sides of each of four blocks), the sidewalks were not widened, and the tree planting was not extensive, so beautification construction was easily and quickly accomplished, taking about nine months. Nonetheless, the total process of BART construction followed by sidewalk improvement construction was a trying period for area merchants and residents. Major disruption lasted four to five years along the narrow street; business suffered, and marginal businesses closed down. Merchants surviving the period of construction hoped that BART would bring business to the Mission; instead, it has encouraged area residents to shop downtown, taking business away from the district.¹

Assets and Liabilities

The BART plazas are the only open spaces in this densely commercial area (Plate 29), and they have provided places for community ceremonies and other public activities. The plazas have been a mixed blessing, however, because they have attracted winos, beggars and prostitutes, many of whom moved to the Mission Street plazas after being pressured away from Market Street. At the initiative of area merchants, increased policing of the area has helped to curb nuisance and criminal activity in the plaza areas. The district's council of merchants meets with San Francisco's Chief of Police once a month to discuss the area's problems and law enforcement needs; the police chief then works with the local police captain to abate the problems.

The community readily accepted the BART plazas and adjacent street improvements and appreciated their enhancement of the area. Problems of insufficient maintenance and repair by the city's Department of Public Works have, however, brought mixed feelings about the improvements. The palm trees have not received proper attention and therefore tend to look dry and wilted, although still alive. Some of the trellis plants have died without replacement. Benches have been broken off their foundations and never repaired. Community representatives have registered complaints with the city and the understaffed Department of Public Works about these maintenance problems, which continue to be neglected.

Increased street cleaning problems have come with the BART plaza traffic and the sidewalk improvements. A great deal of debris gathers in the BART

¹ According to George V. Rodriguez, current president of the Mission Merchants Association, a Mission renaissance is now under way. A community task force is studying possibilities for developing the community, stimulating business, and utilizing resources (including BART). The Mission was once the second largest commercial district in San Francisco; it has gone down over the course of many years.



Plate 29

MISSION & 24TH STREETS,
BART STATION ENTRANCE & ASSOCIATED IMPROVEMENTS

station areas. Not enough litter receptacles were provided along the sidewalks, and those provided are too small (with 16-gallon liners) for the amount of litter generated there. Places provided for newspaper racks (large square boxes on pedestals at street corners) are not utilized by newspaper vendors; instead, they collect litter and must be emptied by hand.

Mission Street Conclusions

The sidewalk improvements along Mission Street are not entirely successful. The furniture was not designed to ensure permanence; moreover, the many elements crowd the narrow sidewalks. Because there is inadequate space, the sidewalk seating areas provided are uninviting.

The plazas might better accommodate public functions and ceremonies if they were larger or perhaps if less central space were used for the BART station opening.¹ The metal fences between the border planters and the buildings are a cold, confining gesture; businesses might have been encouraged to open their buildings onto the plazas and local muralists encouraged to provide visual backdrops. Partially, these design problems are the result of a lack of proper communication between designers and the people of the Mission District.

SHATTUCK AVENUE, BERKELEY

The downtown Berkeley BART station has six entrances on Shattuck Avenue near Center Street. The University of California campus lies one block to the east of the BART station; Berkeley's Civic Center lies one block to the west. Shattuck Avenue near BART is a wide commercial street, lined with specialty stores (stereo, bicycle, sporting goods, health foods), department stores, restaurants, movie theaters, banks and the main Berkeley Public Library. South of Durant Avenue it gradually becomes dominated by car dealers, automotive and hardware stores. North of University Avenue it becomes residentially oriented.

Street improvements were made along Shattuck Avenue between Adeline and University Avenue (a total of 13 short blocks) in conjunction with the new BART station. These improvements are estimated to have

¹ The plazas are functionally satisfactory from a BART point of view. Their shortcomings in community interface may represent a lack of communication by BART with the community to determine its needs and preferences.

cost \$100,000 a block;¹ along with BART construction, they were completed over a period of about five years. Part of the money for the project came through a master agreement with BART whereby money was received from BART according to a value assigned to city facilities displaced during station construction (these included a small park and fountain at Shattuck Avenue and Center Streets); the rest of the funding came mainly from gas taxes.

Constitution Plaza

The BART station's domed main entrance opens onto a block-long, 35- to 50-foot-wide, bricked plaza. The space is divided into circulation space (near the stores and along the street) and a quiet central seating area by low brick partitions to which wooden benches are attached. The center area has trees planted in round concrete planters and offers seating in sun or shade (Plate 30). The central area is little used during much of the year, while the circulation areas, especially near BART entrances, are often over crowded. Pastry stands near the BART dome have many customers; a line of newsracks, a distribution stand for U.C.'s Daily Californian and a large brick planter also occupy the area. Along the sidewalk near the stores, street vendors often set up stands, adding to the traffic congestion. AC Transit patrons wait for buses along the plaza's street-adjacent side. There are no bike racks near the BART dome, so many bikes are chained to trees and poles. (Across the street, where bike racks were installed, trees and poles still seem to be used first, suggesting that the racks do not provide adequate security.) Beside the BART stairway entrance on the south end of the block, there is a large brick enclosure (about 10 feet high) which is part of the BART exhaust system.

Street and Sidewalk Improvements

Before improvement, Shattuck Avenue had 13-foot-wide sidewalks and a narrow median strip which provided diagonal parking in what was once the Key System train right-of-way. The street was clearly oriented to vehicular traffic. Now it includes a wider median strip (planted with evergreen and deciduous trees) which provides left-turn lanes. In addition, there are narrow, low-planted side strips which separate the street's travel lanes from the head-on parking areas (Plate 31). Traffic lights were installed at most intersections, serving to slow the vehicular traffic flow.

¹ Source: Berkeley Department of Public Works.



Plate 30

SHATTUCK AVENUE, BART STATION ENTRANCE AND ASSOCIATED IMPROVEMENTS



Plate 31
SHATTUCK AVENUE IMPROVEMENTS

The widened sidewalks feature a "bulb" at the end of every block to separate the head-on parking from the cross-street traffic as well as to provide additional pedestrian space. If there is demand, the pedestrian space could easily be increased again, at the cost of eliminating parking space, by filling the area between the "bulbs." There are wheelchair ramps at intersections. Some of the block-end areas were made into landscaped bus stops, small park-like areas with grouped seating. Other end areas are planted with a single tree or a thicker planting of shrubbery. A square, black granite fountain in front of the public library encloses four wide "ribbons" of water that seem to be woven into a symmetrical sculpture of moving water,¹ and the adjacent park area is more extensive than those on other blocks. Food vendors' stands occupy some of the block-end areas on the west side of Shattuck near the BART station.

For the two blocks between Center Street and University Avenue, Shattuck becomes two, one-way streets. Here the sidewalk treatment is similar in terms of tree plantings and bus stop areas; the sidewalks are narrower; however, parking is parallel and there are no enlarged end areas or traffic strips.

Liabilities

There are a few ongoing problems with the improved street. Litter accumulates along the street, especially at bus stop areas and in the plaza. The permanent concrete litter receptacles are inadequate in high-traffic areas and often have broken tops and liners. In the plaza, not enough receptacles are provided. Newsrack proliferation in the plaza area is a sidewalk traffic hazard. The sidewalk "bulbs" are a guidance problem for blind pedestrians and create an awkward movement for drivers turning right from the parking areas. The plaza extends into the street, making a job that is difficult for southbound vehicles to maneuver.

Shattuck Avenue Conclusions

The design of the Shattuck Avenue improvements for safety and increased pedestrian traffic is generally successful. Vehicular traffic flows more slowly, the head-on parking is well isolated, and overall pedestrian space

¹ The fountain which was displaced by BART's construction had been donated to the city. The benefactor was asked how its replacement funds should be used, and he responded by hiring an architect to design the existing fountain. There is some feeling that the fountain is inappropriately formal and too large for the area it stands in.

is ample. The landscaping along the sidewalks is pleasant. The plaza provides an orientation area for BART riders and AC Transit patrons. There are, however, some conceptual problems:

- At Constitution Plaza the walled-off center area dominates the space, crowding pedestrian activity on the narrow sidewalk around the plaza.
- While the improvements provide a needed link between University Avenue, the BART station and the downtown shopping area, the sidewalk improvements south of Dwight are used by only a small amount of pedestrian traffic.

The logic of Shattuck Avenue improvements was based primarily on the expedience of BART construction and funding. As was the case with Market Street, improvements were made uniformly over the length of the street torn up by BART construction. While this works along Market Street because it coincides with the main focus of the city's activity, there are three scattered sites of activity near the downtown Berkeley BART station: the stores along Shattuck, the U.C. campus, and the Civic Center. Major pedestrian traffic goes east/west along Center Street for a block in each direction as well as going north/south along Shattuck. The functional logic of the Shattuck Avenue improvements could be enhanced by improvements to the pedestrian space along the east/west axis of the plaza, giving physical reinforcement to the plaza's role as transportation hub for a radiating area of activity.

NEVIN MALL, RICHMOND

The BART station at Richmond is at the northwest end of the BART system, serving direct lines to Fremont and eventually to Daly City. It is located beside previously existing Southern Pacific tracks, between "uptown" and "downtown" Richmond, and it has provided impetus for the redevelopment of the downtown area. The station mezzanine is below grade, open to an intersecting pedestrian mall. The mall is a wide landscaped walkway which stops at the street to the east, while to the west it becomes a series of landscaped "events" leading to the new Social Security Administration building that is the cornerstone for downtown redevelopment.

Scope and Character

Nevin Mall was created by closing off six blocks of Nevin Avenue between 13th and 19th Streets. It was designed by Sasaki-Walker & Associates, and its cost of about \$300,000 was paid by urban renewal funds. The first stage

of mall construction was accomplished in conjunction with BART construction, taking about eight months and including the area between 15th Street and 19th Street (both sides of the station). The mall landscaping nearest the station includes a graded concrete walkway inset with brick, planted "islands" and ivy-planted embankments above short retaining walls (Plate 32). Stairways on both sides of the station lead to bus connections and BART parking lots.

On the east side of the station, the mall reaches grade at 19th Street and stops in an area characterized by older, single-family homes; there is no indication of the business area a few blocks away. On the west side the mall becomes a park when it reaches grade. Large mounded center plantings of grass and trees give the mall a sculptural dimension and create spaces for blacktopped seating areas furnished with square redwood benches and a redwood/concrete poster kiosk. Tall, four-element standards in the center of each mound light the area, which ends at 15th Street with concrete bollards.

The second period of construction affected the areas between 10th and 15th Streets and was accomplished in another eight-month period. Between 15th and 13th Streets the mall becomes a more sophisticated city plaza adjacent to the Social Security building. The blacktopped plaza/mall features a simple fountain (a single water jet in the center of a square pool) with nearby redwood bench seating, a formal planting of sycamores with redwood seating placed among the trees, and a small, square area planting of flowering shrubs.

At 13th Street, Nevin Avenue again becomes a conventional street. Sidewalks were widened along one side of the street, and trees were planted. In a third stage of construction, the sidewalk widening and tree planting will be extended to 6th Street. Trees are also being planted along cross streets.

Concept

The decision to build a mall was made while the BART station was being planned; its focus, the "new downtown," was a pre-BART redevelopment concept which BART has helped make feasible. The presence of BART was a factor in the decision to build the Social Security Administration building in Richmond; that building was completed and occupied in 1975. Construction began in 1977 on a Kaiser Medical Center, which will serve about 40,000 enrollees throughout western Contra Costa County.¹

1 Information from Richmond Redevelopment Agency.

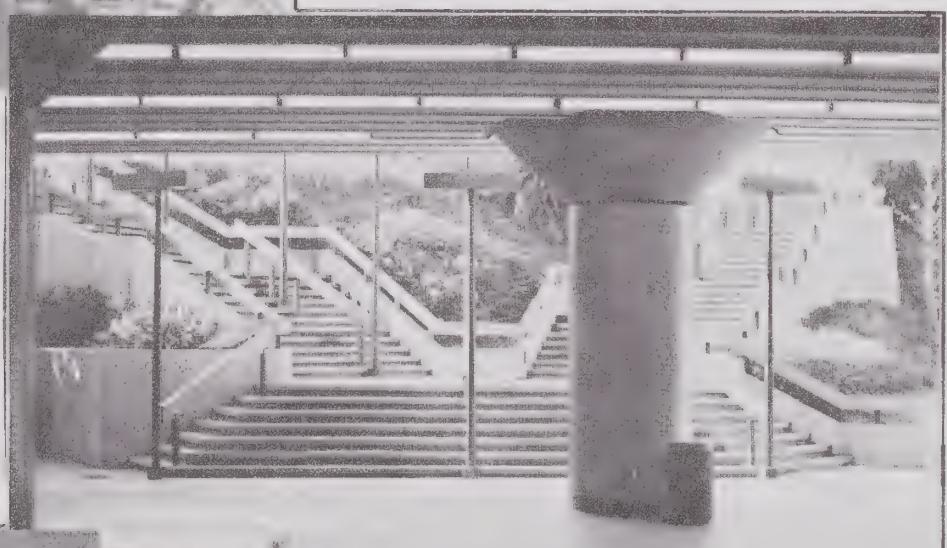


Plate 32
NEVIN AVENUE IMPROVEMENTS

It is planned that the Richmond BART station will eventually become part of a transportation center. Groundbreaking for a new Amtrak station next to BART took place in December 1976. Escalators in the station will provide direct access to BART for Amtrak passengers. Negotiations are being conducted with Greyhound and Continental Trailways to relocate their local bus stations in the vicinity. With heavier traffic, the downtown focus of the mall will become increasingly effective.

Maintenance and Community Reaction

Construction of the mall caused little inconvenience because the area was already cleared for redevelopment. Maintenance has not been a problem once the original issue of responsibility was settled. The Operations Division of the City's Public Works Department now maintains the hard surface, while Recreation and Parks maintains the plant material. Litter receptacles are currently sufficient and the hard surfaces are easily maintained. Evergreen (pine, carob, Indian Laurel fig, evergreen pear) and deciduous trees (sycamore, tulip tree, white alder) were planted in the area; seasonal leaf-dropping will increase the maintenance task as trees mature. There has been some vandalism in the area (i.e., chopping down of trees), but no victim-oriented crime. In general, the improvements have been well received by the Richmond community.

Nevin Mall Conclusions

Nevin Mall provides variety and pleasant surroundings for BART patrons arriving in Richmond. By offering easy access, it helps to establish the "new downtown" as the most likely location for new businesses and other ventures that will rely on BART to deliver their employees and clients. Currently the mall is not highly used, serving basically the Social Security Administration employees. The Kaiser Center and other new development will considerably increase mall traffic, making it more valuable to the city and bringing it more of the problems of high-traffic areas.

APPENDIX A OVERVIEW OF BAY AREA GROWTH AND DEVELOPMENT

Introduction

A discussion of the San Francisco Bay Area is presented here to supplement the material presented in Chapter 3 (Regional Setting). It offers additional information on past, present and projected future patterns of population, employment, urbanization and transportation patterns within the nine-county Bay Area as further background for consideration of BART-associated development.

The intent of this discussion is not to present a definitive demographic/economic description of the region but, rather, to establish a general understanding of recent Bay Area development patterns. Most of the information discussed was originally compiled by Security Pacific Bank and by the Association of Bay Area Governments (ABAG)/Metropolitan Transportation Commission (MTC). In most instances, the latest figures available were for 1970; whenever possible, however, descriptive statistics for later years are used.

Population

The 1975 San Francisco Bay Area population was estimated at 4,846,600.¹ This is an increase of one-third over the 1960 population of 3,639,000 (Table A-1). Projections indicate that, by the year 1990, population will increase approximately 15 to 20 percent over the 1970 population (Table A-2). Alameda County is projected to grow at a rate less than the nine-county average; Contra Costa County is expected to grow considerably faster; and San Francisco County is expected to continue to lose population. This would be a continuation of the 1960-1970 growth patterns for these counties (see Chapter 3, Figure 2).

Within the Bay Area, population is concentrated in 2 of 9 counties and in 9 of 93 cities. Santa Clara County (population 1,200,000) and Alameda County (population 1,100,000) house nearly half of the region's population (Figure A-1). Nearly 40 percent of the people live in the six Bay Area cities with populations over 100,000. They are: San Francisco (671,100), San Jose (547,500), Oakland (336,600), Fremont (116,200), Berkeley (108,500), and Sunnyvale (106,400).

¹ 1975 population estimate from California Department of Finance and Security Pacific Bank Research Department.

Table A-1

SAN FRANCISCO BAY AREA POPULATION BY COUNTY, 1950-1975

County	Census April 1, 1950	Census April 1, 1960	Census April 1, 1970	Estimate January 1, 1975
Alameda	740,315	908,209	1,073,184	1,089,500
Contra Costa	298,984	409,030	558,389	587,200
Marin	85,619	146,820	206,038	216,500
Napa	46,603	65,890	79,140	88,200
San Francisco	775,357	740,316	715,674	671,100
San Mateo	235,659	444,387	556,234	573,900
Santa Clara	290,547	642,315	1,064,714	1,193,400
Solano	104,833	134,597	169,941	182,500
Sonoma	103,405	147,375	204,885	244,300
9-County Total	2,681,322	3,638,939	4,628,199	4,846,600

Source: "A Special Report on the Economy of the San Francisco Bay Area," prepared by the Security Pacific Bank Research Department, San Francisco, September 1975, with data from the U.S. Department of Commerce and the California Department of Finance.

Table A-2

POPULATION PROJECTION, 1990
(Thousands of Persons)

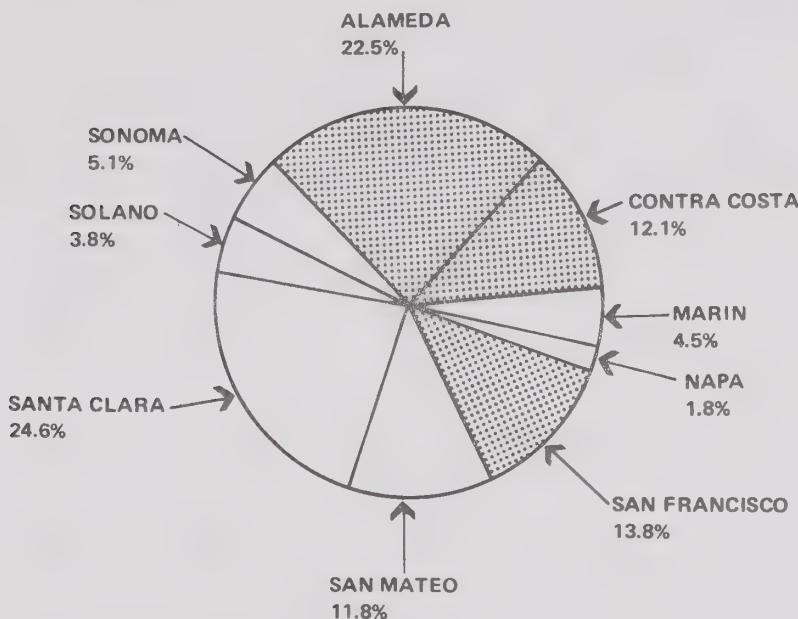
Area	1970 (Base Year)	1990 (Levels)	Percent of Change
Alameda County	1,073	1,163-1,180	+ 8-10%
Contra Costa County	558	691-774	+24-39%
San Francisco County	716	642-645	- 10%
Bay Area (9-County)	4,628	5,284-5,622	+14-21%

Source: Association of Bay Area Governments (ABAG), Provisional Series 3 Projections (Berkeley, California, March 1977).

Figure A-1

PERCENT DISTRIBUTION OF POPULATION --

San Francisco Bay Area, by County - 1975



Source: Security Pacific Bank Research Department

Before 1950, San Francisco and Oakland experienced most of the region's population growth. Since 1950, the major growth has occurred in the southern portion of the Bay Area, while San Francisco and Oakland have declined in population. Ten of the region's 15 cities which doubled in population between 1960 and 1970 are in Santa Clara County and southern Alameda County.

The presence of BART has had an indeterminate effect on population patterns within the Bay Area. Between 1970 and 1975, a number of cities traversed by BART showed considerable population growth, while others lost population (Table A-3). Cities along the Richmond line generally declined or gained very little in population. Along the Concord line and southern portions of the Fremont line, cities increased in population. Cities away from BART lines show similar growth patterns.

Table A-3
POPULATION TRENDS OF CITIES TRAVERSED BY BART, 1950-1975

City	1950	1960	1970	1975 ^b	% Change '60-'70	% Change '70-'75
Albany	17,590	14,804	14,674	14,400	- 1%	- 2%
Berkeley	113,805	111,268	116,716	108,500	+ 5%	- 7%
Concord ^a	6,953	36,000	85,164	91,900	+137%	+ 8%
Daly City ^a	15,191	44,791	66,922	72,500	+ 49%	+ 8%
El Cerrito	18,011	25,437	25,190	23,700	- 1%	- 6%
Fremont	--	43,790	100,869	116,200	+130%	+15%
Hayward ^a	14,272	72,700	93,058	94,200	+ 28%	+ 1%
Lafayette	--	--	20,484	20,300	--	+ 1%
Oakland ^a	384,575	367,548	361,561	336,600	- 2%	- 7%
Richmond ^a	99,545	71,854	79,043	73,600	+ 10%	- 7%
San Francisco	775,357	740,316	715,674	671,100	- 3%	- 6%
San Leandro ^a	27,542	65,962	68,698	68,000	+ 4%	- 1%
Union City ^a	--	6,618	14,724	27,800	+122%	+89%
Walnut Creek ^a	2,420	9,903	39,844	47,250	+302%	+19%

^a Cities which annexed additional territory between 1960 and 1970.

^b Estimate for 1975 from California Department of Finance and Security
Pacific Bank.

Source: U. S. Department of Commerce, Bureau of the Census, 1970 Census
of the Population, Number of Inhabitants -- California
(Washington, D.C., September 1971).

Employment

The Bay Area civilian labor force in 1975 was estimated at 2,200,000, with 2,000,000 employed.¹ San Francisco, Santa Clara, Alameda and San Mateo Counties accounted for about 80 percent of the region's employment. Of the nine counties, Santa Clara County experienced the greatest numerical and percentage growth in employment during the period 1960-1970, paralleling its growth in population (Table A-4). Contra Costa is the only BART county with an employment rate for that period higher than the nine-county average (Figure A-2). In 1960, the three BART counties provided 64 percent of the region's total employment, while in 1970 they accounted for 58 percent; this decline is indicative more of the strong growth in the southern area than of a lack of growth in the three counties served by BART.

Table A-4

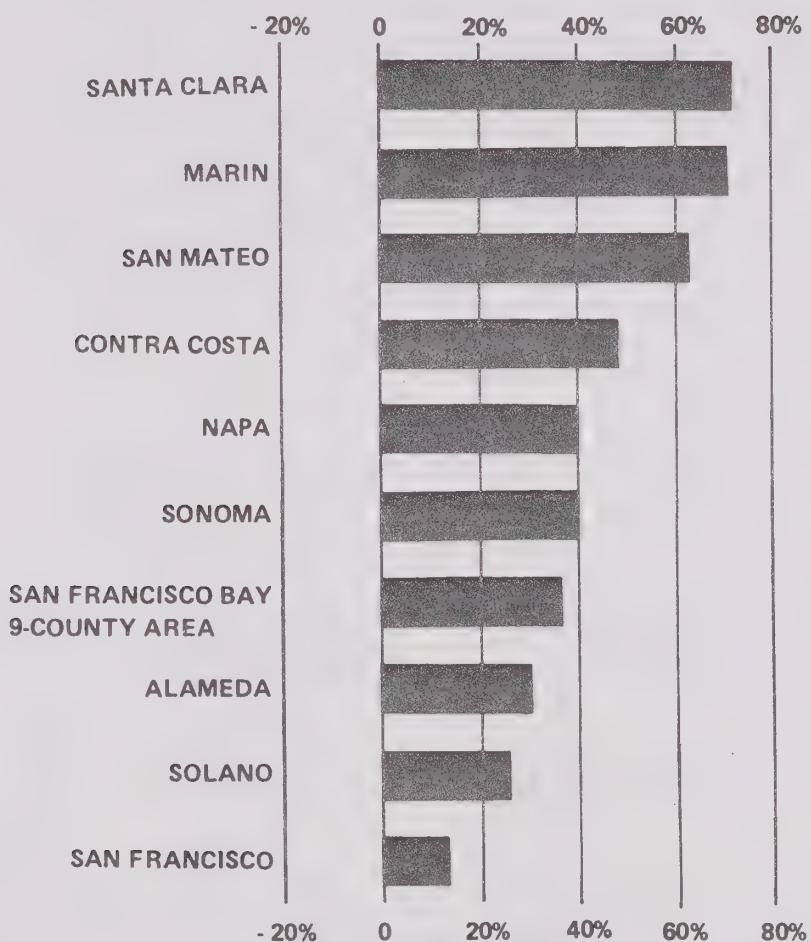
EMPLOYMENT TRENDS IN THE SAN FRANCISCO BAY AREA, 1960-1970

County	1960 Employment (all industries)	1970 Employment (all industries)	Numerical Change	Percent Change
Alameda	353,000	459,000	106,000	+30.0
Contra Costa	103,400	152,300	48,900	+47.3
Marin	32,900	55,600	22,700	+69.0
Napa	17,900	25,100	7,200	+40.2
San Francisco	475,900	536,300	60,400	+12.7
San Mateo	131,100	212,700	81,600	+62.2
Santa Clara	248,000	423,900	175,900	+70.9
Solano	43,300	54,900	11,600	+26.8
Sonoma	46,900	65,600	18,700	+39.9
9-County Region	1,452,400	1,985,400	533,000	+36.7

Source: "San Francisco Bay Area Report," prepared by the Economic Research Division, Security Pacific Bank, San Francisco, April 1971, with data from the California Department of Human Resources Development.

¹ From "A Special Report on the Economy of the San Francisco Bay Area," prepared by the Research Department of the Security Pacific Bank, San Francisco, September 1975.

Figure A-2
 PERCENT CHANGE IN TOTAL EMPLOYMENT
 San Francisco Bay Area, By County, 1960-1970



Source: Security Pacific Bank Research Department

Employment projections made by ABAG are shown in Table A-5. Ranges given account for alternative growth scenarios. Regional employment growth to the year 1990 is projected at a greater rate as population growth; among BART counties, the projected employment growth rate is higher than that for population in Contra Costa and San Francisco counties, but lower in Alameda county.

Table A-5
 EMPLOYMENT PROJECTIONS TO 1990
 (Thousands of Employees)

Area	1970 (Base Year)	1990 (Levels)	Percent of Change
Alameda County	470	480-507	+ 2- 8%
Contra Costa County	143	189-213	+32-49%
San Francisco County	504	568-595	+13-18%
Bay Area (9-County)	1,976	2,400-2,580	+21-31%

Source: Association of Bay Area Governments (ABAG), Provision Series 3 Projections (Berkeley, California, March 1977).

Eighty percent of the region's workers in 1970 were employed in four of eight basic industry groups: wholesale and retail trade, services, government, and manufacturing (Table A-6). Services and government were the industries leading in 1960-1970 employment growth numbers for the Bay Area and for each of the three BART counties. The leading industry changed during that period in the region, in each of the BART counties and in Marin County (Table A-7).

Table A-6
EMPLOYMENT BY INDUSTRY, 1970

Industry	Alameda County	Contra Costa County	San Francisco County	9-County Region
Agriculture/Forestry/ Fisheries/Mining	6,900	3,200	1,300	36,900
Contract Construction	22,500	11,000	21,800	100,000
Manufacturing	83,500	27,700	58,100	347,800
Finance/Real Estate/ Insurance	19,400	5,400	69,000	127,100
Services	89,300	31,100	122,600	425,200
Wholesale/Retail Trade	96,600	33,500	111,700	414,700
Transportation/ Utilities	34,300	9,200	61,400	163,200
Government	<u>106,500</u>	<u>31,200</u>	<u>90,400</u>	<u>370,500</u>
All-Industry Total	459,000	152,300	536,300	1,985,400

Source: "San Francisco Bay Area Report," prepared by the Economic Research Division, Security Pacific Bank, San Francisco, April 1971, with data from the California Department of Human Resources Development.

Table A-7
LEADING INDUSTRIES IN SAN FRANCISCO BAY AREA,
1960 and 1970

County	1960 Leading Industry	1970 Leading Industry
Alameda	Trade	Government
Contra Costa	Manufacturing	Trade
Marin	Trade	Services
Napa	Government	
San Francisco	Trade	Services
San Mateo	Trade	
Santa Clara	Manufacturing	
Solano	Government	
Sonoma	Trade	
9-County Region	Trade	Services

Source: "San Francisco Bay Area Report," prepared by the Economic Research Division, Security Pacific Bank (San Francisco, April 1971); with data from the California Department of Human Resources Development.

Urbanization Patterns

Corridors of urban development in the Bay Area reflect the presence of the Bay and the inland hills. North-south spines of development occur along both sides of the Bay, and an east-west spine extends from the Bay through central Contra Costa County to the Concord area.

The historical core for population and employment has been San Francisco-Oakland-Berkeley. A second core, San Jose-Santa Clara, is rapidly developing in the southern Bay Area.

Within the nine-county Bay Area there are 1,250 square miles of useable¹ land. By 1970, 57 percent of this land was developed for urban uses

¹ Useable area excludes inland bodies of water, land designated as permanent open space, and most of the controlled development open space in the ABAG Regional Plan 1970-1990.

(Table A-8). Urbanization of San Francisco County was virtually complete in 1975, while Alameda County had over two-thirds of its useable land developed, and Contra Costa County had developed nearly half.

Table A-8
URBANIZED AREA, PROJECTED TO THE YEAR 1990

Area	Thousands of Acres			% of Area Urbanized ^b	
	1975 (Base Year)	1990 ^a	Percent Change	1975	1990
Alameda County	90	113	26%	71%	89%
Contra Costa County	68	112-133	65-96%	48%	78-93%
San Francisco County	24	24	0%	96%	96%
Bay Area (9-County)	447	696-796	56-78%	51%	80-91%

^a Range allows for alternative growth scenarios.

^b Urbanized land includes residential, local serving basic, and streets and highways.

Source: Association of Bay Area Governments (ABAG), Provisional Series 3 Projections (Berkeley, California, March 1977).

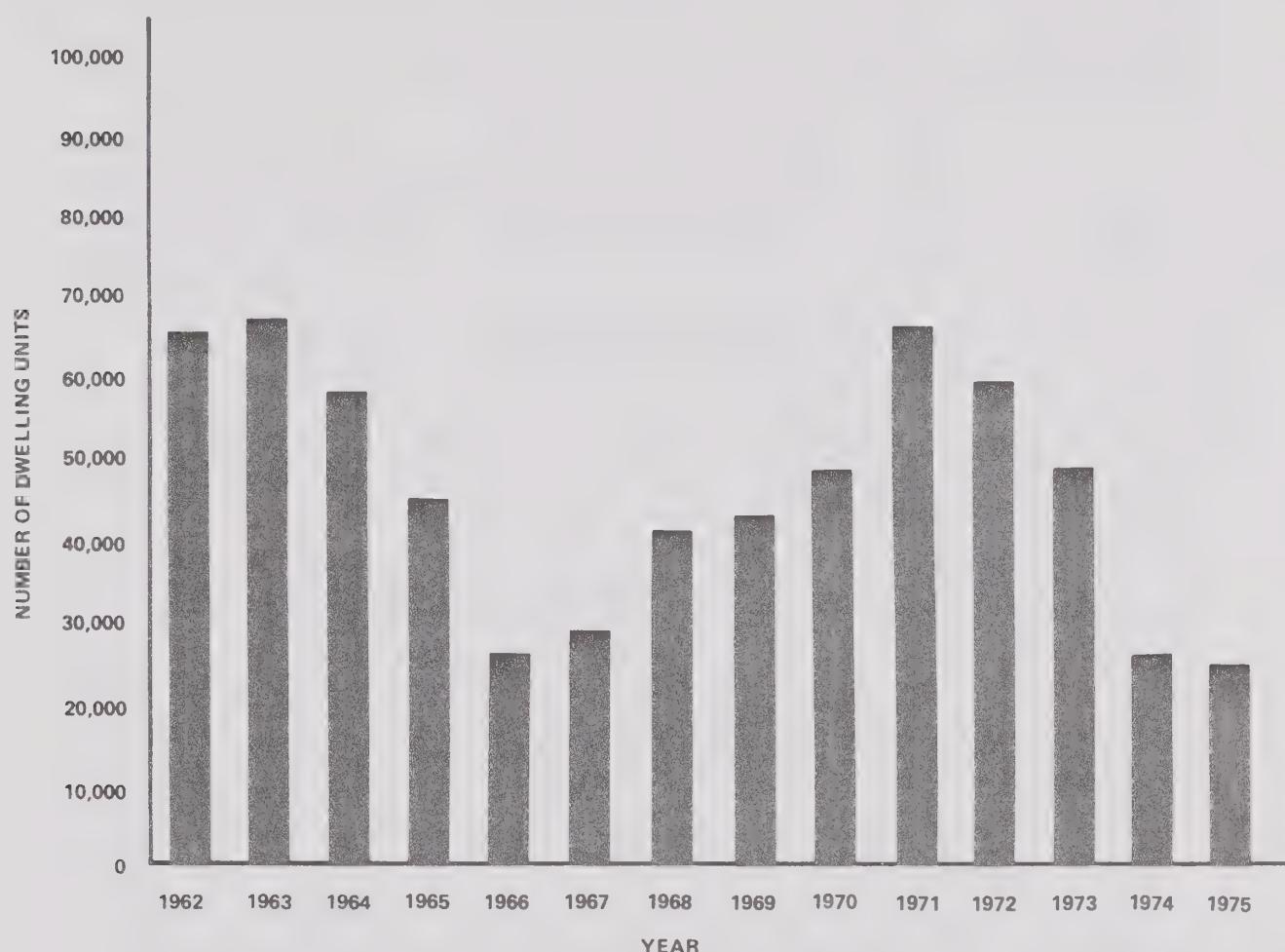
As reflected by recorded subdivisions, land development in the Bay Area has slowed over the past 15 years. In 1960-1961, over 500 new tracts and nearly 25,000 new lots were recorded; in 1974-1975, the number of tracts was down to 237 and lots to fewer than 10,000. This downward trend was evident in each of the three BART counties.

The number of family dwelling units included in building permits issued from 1962 through 1975 in the Bay Area has gone up and down. Figure A-3 charts dwelling unit permits issued in the nine-county Bay Area for these years. Each of the three counties served by BART shows a similar pattern.

Figure A-3

DWELLING UNITS INCLUDED IN BUILDING PERMITS

San Francisco Bay Area, By County, 1962-1975



From 1962 through 1975, the dwelling unit "capture rate" for each of the BART counties has remained a consistent fraction of the nine-county total, averaging 19 percent for Alameda County, 15 percent for Contra Costa County, and 6 percent for San Francisco County. By contrast, Santa Clara County's share has ranged from 23 percent to 43 percent during the same period, averaging 31 percent.

Transportation

The Bay Area's extensive highway network served an estimated 14 to 16 million trips per day in 1975.¹

The major public transit operators, together with smaller public services in San Mateo, Santa Rosa, Union City, and Napa, made approximately 700,000 transit trips per day in 1975. The major operators include:

- Municipal Railway of San Francisco (Muni) - Bus, trolley, and streetcar service in the City of San Francisco.
- Alameda-Contra Costa Transit District (AC) - Bus service in Alameda and Contra Costa Counties, with transbay service to San Francisco.
- Golden Gate Bridge, Highway and Transportation District (Golden Gate) - Bus service in Marin County, with connecting service to San Francisco via ferries and buses.
- Bay Area Rapid Transit District (BART) - Rail rapid transit in Alameda, Contra Costa, and San Francisco Counties.
- Santa Clara Transit District - Bus service in San Jose-Santa Clara areas.

In addition, the region has 50 private transit systems for which no patronage figures are available. The largest private services are Southern Pacific Railroad and Greyhound Lines, both of which operate in San Francisco, San Mateo, and Santa Clara Counties.

As of 1974, there were 17,600 miles of roadway in the Bay Area,² distributed among the nine counties, as shown in Table A-9. Figure A-4 indicates major freeways in the three BART counties, accounting for 7 percent of the total roadways in those counties.

¹ Caltrans, District 4.

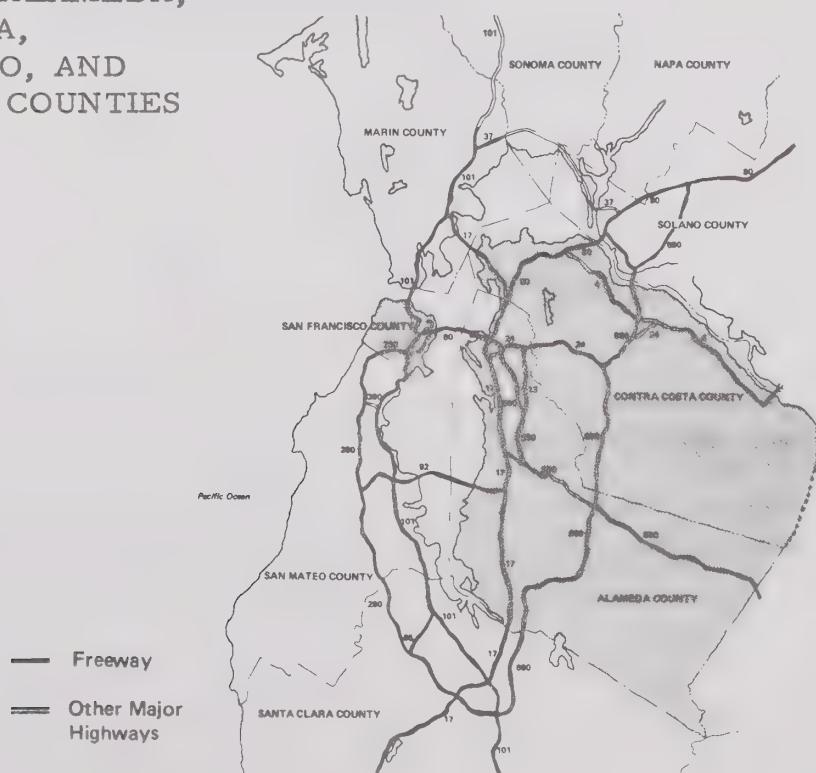
² California Statistical Abstract, 1975.

Table A-9
ROAD MILEAGE BY COUNTY, 1974

County	State/Natl.	City	County	Total
	Highways	Streets	Roads	
Alameda	210	2,250	545	3,005
Contra Costa	138	1,292	1,022	2,452
Marin	311	513	421	1,245
Napa	128	201	480	809
San Francisco	60	844	--	904
San Mateo	215	1,335	365	1,915
Santa Clara	249	2,795	837	3,881
Solano	161	476	650	1,287
Sonoma	255	436	1,440	2,131
Bay Area Total	1,727	10,142	5,760	17,629

Source: California Statistical Abstract, 1975.

Figure A-4
FREEWAYS IN ALAMEDA,
CONTRA COSTA,
SAN FRANCISCO, AND
SURROUNDING COUNTIES



Findings of travel mode studies are inconsistent, but it is clear that automobiles make more than 75 percent of the trips in the Bay Area, while transit systems make fewer than 15 percent. Findings include the following:

- A 1965 Bay Area Transit Study Commission survey found that for all trips made (11.8 million/day), 76 percent were made by automobile, 8 percent by transit, and 16 percent by foot. The mix varied by such factors as residential density, dwelling unit structure, income, and car availability.
- From Census data, travel modes for work trips only, in 1960 and 1970:

	<u>1960</u>	<u>1970</u>
Auto	70%	78%
Transit	15%	11%
Walking	8%	6%
Other	<u>7%</u>	<u>5%</u>
	100%	100%

- From the BART Impact Program 1975 telephone survey (1,000 respondents) taken in Alameda, Contra Costa, San Francisco, and northern San Mateo Counties, the overall mode mix was found to be 87 percent automobile, 13 percent transit.

ENVIRONMENT PROJECT DOCUMENTATION

- Environmental Impacts of BART:
Final Report*
(DOT-BIP-FR 7-4-77)
- Responses of Nearby Residents to
BART's Environmental Impacts*
(DOT-BIP-TM 25-4-77)
- Indirect Environmental
Impacts*
(DOT-BIP-TM 24-4-77)
- The User's
Experience*
(DOT-BIP-TM 23-4-77)
- Methodological Report: Responses of Nearby
Residents to BART's Environmental Impacts
(WN 4-4-77)
- Phase II Community
Monitoring
(WN 3-4-77)
- Phase II Addenda to
Direct Impacts
(WN 2-4-77)
- Phase II Project
Implementation Plan
(PD 20-4-75)
- Interpretive Summary:
Interim Service Findings
(1976)
- Environmental Impacts of BART:
Interim Service Findings*
(DOT-BIP-FR 2-4-75)
- Impacts of BART on the Social Environment:
Interim Service Findings*
(DOT-BIP-TM 19-4-76)
- Impacts of BART on Visual Quality:
Interim Service Findings*
(DOT-BIP TM 18-4-76)
- Impacts of BART on the Natural Environment:
Interim Service Findings*
(DOT-BIP TM 17-4-76)
- Acoustic Impacts of BART:
Interim Service Findings*
(DOT BIP TM 16-4-76)
- Impacts of BART on Air Quality:
Interim Service Findings*
(DOT-BIP-WP 20-4-76)
- Analysis of Pre-BART Urban Residential
Environment Survey*
(DOT-BIP WP 24-4-76)
- Theory Background for Study of BART's
Impacts on Human Perception and Response*
(DOT-BIP-WP 23-4-76)
- Community
Monitoring*
(DOT-BIP WP 22-4-76)
- BART and Its Environment:
Descriptive Data
(WN 1-4-76)
- Research
Plan
(PD 9-4-75)
- Phase I
Work Plan
(PD 4-1-74)

* Document is available to the public through the National Technical Information Service (NTIS), Springfield, Virginia 22151.
Other documents are MTC internal working papers.

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